ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION

NOVEMBER 1958

PRICE ONE DOLLAR

FOUNDED 1866

Planning the Modern Mine

How modernization benefits the mine and the man 87

Why industry must plan now for the future 89

How Anaconda planned the El Salvador copper project 93

When is your mine and plant equipment obsolete? 102

What makes a modern mine plant layout attractive? 104

Why pollution control pays 108

Part of a cooperative effort by 34 McGraw-Hill magazines to highlight the need for farsighted planning by industry today.

In this issue, E&MJ spotlights the work of the engineer, the designer, the control expert and the manufacturer of modern equipment. See contents, page 2.

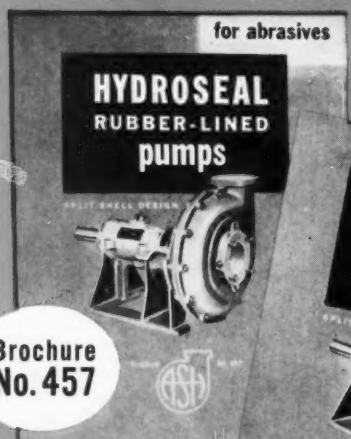
PLAN '59 *Modernize now for growth and profits*

A SPECIAL REPORT FROM McGRAW-HILL TO AMERICA'S BUSINESS EXECUTIVES

Your library for better pumping

abrasives corrosives acids

Gives easier way to select the proper type and size of pump ....



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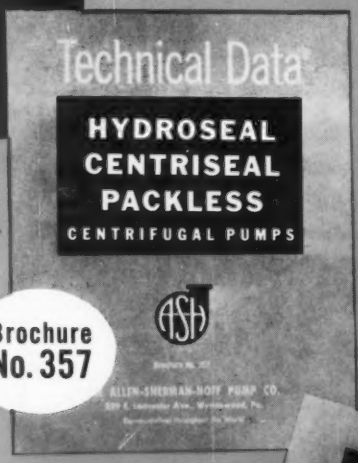

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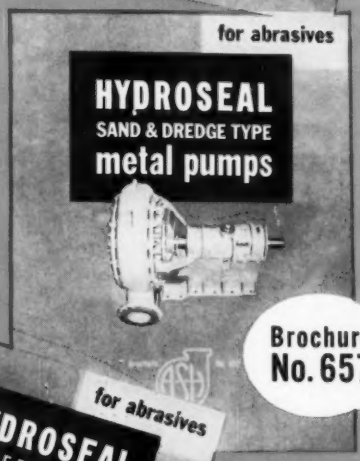

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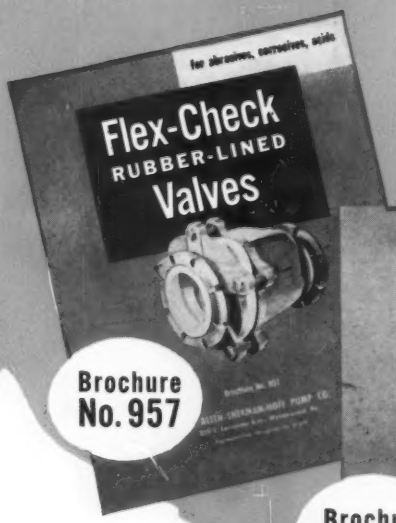

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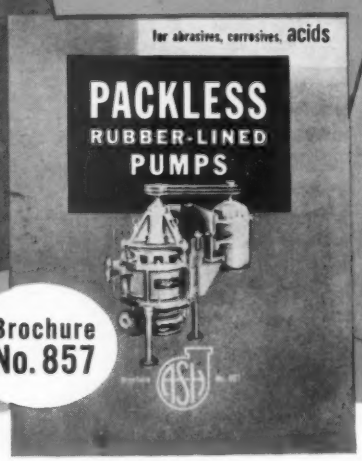

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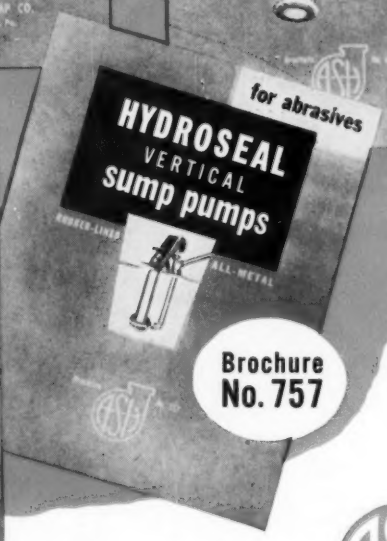

Brochure No. 757

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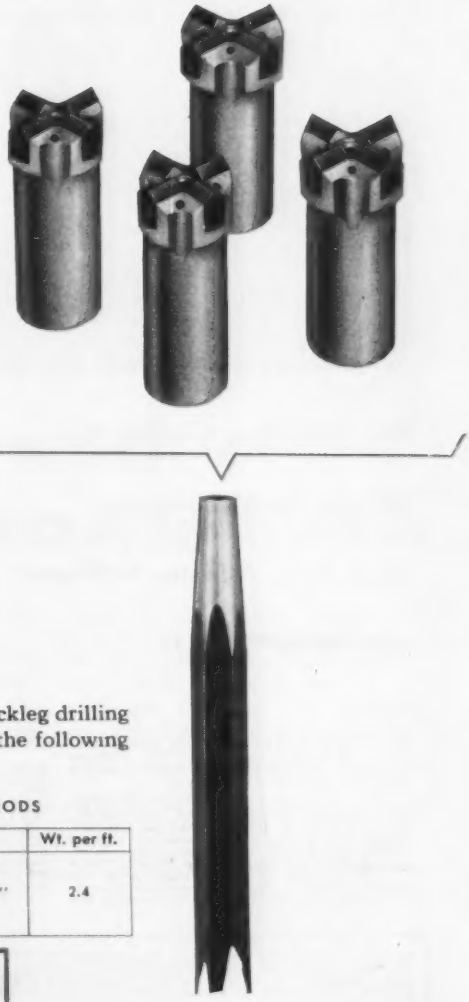
MAXIMIX RUBBER PROTECTED

What To Use for Jackleg Drilling...

I-R CARSET® SOCKET BITS

combine the advantages of DETACHABILITY with one-piece SIMPLICITY



For small-hole drilling, in sizes from 1¼" to 1⅝", Ingersoll-Rand now offers Carset bits with a tapered socket connection that combines the rugged simplicity of a one-piece carbide-insert steel with the convenience, flexibility and long-range economy of conventional threaded bits. A brass shim between bit and rod equalizes impact pressure in the connection. Bits are removed by a simple knock-off block.

With these I-R Socket Bits and tapered rods you get the unsurpassed *drilling speed* and service-proved dependability of a genuine Carset bit with four Carboloy inserts—plus all these other time-saving, cost-saving advantages:

- No need for forging or heat-treating equipment on the taper end.
- Rods reconditioned simply by taper grinding or lathe turning.
- Bit size can be changed without changing steels.
- A broken steel is not a total loss—you save the bit and can re-grind the end of the steel.
- Bit grinding is faster and easier—operator doesn't have to manipulate a long length of steel.

For maximum convenience and long-range economy on your next Jackleg drilling job, try I-R Carset Socket Bits. Bits and rods are available now in the following standard sizes:

I-R CARSET SOCKET BITS

Gauge	Symbol	Weight
1¼"	1¼—XLS-5	10 oz.
1⅜"	1⅜—XLS-5	12½ oz.
1½"	1½—XLS-5	13 oz.
1⅝"	1⅝—XLS-5	15 oz.

I-R ALLOY STEEL RODS

Length	Symbol	Wt. per ft.
18", 24", 38" 48", 54", 60" 72", 84", 90" 96", 108" 120", 144"	JABXLA-(length)"	2.4

Ingersoll-Rand

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A CONSTANT STANDARD OF QUALITY IN EVERYTHING YOU NEED FOR DRILLING ROCK

ENGINEERING AND MINING JOURNAL

92nd YEAR OF PUBLICATION

NOVEMBER 1958

VOL. 159 NO. 11

Behind the By-Lines	4	Markets	22
E&MJ Outlook	17	New Products Digest	43
This Month in Mining	18	Books	120
Washington Impact	20	Operating Ideas	122
		Personals	130

How Modernization Benefits the Mine And the Man 87

Why Modernize Now? 89

How Anaconda-Jurden Associates Achieve Modern Industrial Design 93

When to Replace Old Equipment 102

Architecture Aids Community Relations 104

How Pollution Control Pays 108

Modern Mining Features 110

Black Lake Asbestos Dedicated 18

AMC Studies Quotas 138

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B.F.Goodrich

One belt does the work of 3 on high lift, long distance hauls

Oldest steel cord belt on Iron Range now in its 11th season

Problem: It's over a third of a mile and a 340-foot lift from the bottom of that iron ore mine up to railroad cars. Getting ore out of a deep pit like this used to take a series of three or more conveyor belts. No one belt could be strong enough for the job without being so heavy and stiff it would be impractical.

What was done: B.F.Goodrich engineers went to work on the problem, and developed steel cord construction. In this exclusive conveyor belt design, individual steel cords run lengthwise, each completely surrounded by rubber. These parallel cords give tremendous strength, yet are flexible so that troughing is natural, belt keeps centered on idlers, spillage is held to a minimum.

Savings: With steel cord construction, one conveyor belt now does the job of three or four belts on high lift, long distance installations. Money is saved, maintenance reduced, because the steel cord belt eliminates the transfer points necessary with a conveyor system built in several stages with ordinary belts.

Extra benefits: The B.F.Goodrich steel cord belt installed here has been at work 11 seasons now, hauling 1000 tons of ore an hour up and out of the pit. It has lasted longer than any conveyor belt ever made with steel cords or cables.

Where to buy: Your B.F.Goodrich distributor has exact specifications for the B.F.Goodrich belt described here. And, as a factory-trained specialist in rubber products, he *can* answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept. M-467, Akron 18, Ohio.*

B.F.Goodrich *conveyor belts*

Behind the By-Lines...

Ever since Messer Nicolo Polo told his boy to take a walk, people have been taking frivolous statements seriously. And, more often than not, the result has turned out to be pretty interesting to all concerned.

In our scholarly research into Handy Signs for Home and Office, we have offered several suggestions to the readers of *E&MJ*. Who can forget the Panic Button? Or "Do not engage mouth until brain is in gear?" Or "This is a non-profit organization. (We didn't plan it that way, but that's how it's working out.)"

But the grand-daddy of 'em all appeared in our February issue, back in 1956:

PLAN AHEAD

We liked it then, and we still like it. It had punch, it had a message, it expressed a philosophy. Little did we wot, at the time, that some guys were about to take it seriously. But we wotted pretty quick when, about eight months ago, McGraw-Hill asked its editors to cooperate in a 34-magazine effort to:

PLAN '59 *Modernize now for growth and profits*

While we aren't claiming anything as noisy as Marco's gunpowder or as valuable as his spaghetti, we're pretty sure you'll finish this issue with some exciting facts and figures aboard. Of course, *E&MJ* has been providing cost-cutting and modernization articles for more than 92 years but we're happy to join the group.

We've done some revamping to emphasize our point. The New Products Digest this month is twice its normal size and devoted exclusively to case histories of new products which cite performance data, operations, and time and money saved. If some caviler in the crowd asks how a new product can already have a case history, tell him to study the case of Arizona vs Cavil, Arizona District Court, Tombstone, 1868. There's also a nice account of the funeral of John Motley Cavil, which followed a hanging in which the judge, jury and 34 spectators joyously took part.

When we decided to devote nine pages of this issue to mine planning, we asked around for someone who was up among the leaders in the field. On p 93 you'll find an article based on the design of Anaconda engineers and Wilbur Jurden, their top man. Their efforts over the past few years have run to a total of more than $1-billion worth of mine plant, not only at Anaconda installations, but in iron ore, aluminum, uranium and magnesium.

The record's pretty impressive, and so is the story of the why's and why-nots of mine, plant, power and townsite layout that covers those nine pages of story, photographs and drawings.

Profitable modernization would seem to be tied to a number of factors. As we gathered all the material in this issue together and looked it over, though, one became obvious. (Why is the most obvious the hardest to see?) You'll see it, too, as you read through this issue. For greater efficiency, for greater profit, for better public and employee relations—plan around the man.

Beginning on p 87, we've outlined what some mining companies are doing by way of planning for the human factor, and profiting because of it.

There's another section of this issue dedicated to the men who offer up their waking hours to that terrifying little column heading, "Equipment Cost Per Ton."

In the course of our surveys, more than one mine operator has volunteered the information that he might not have been in business during the recent "troubles" had he not modernized his mine and equipment previously.

The answer appears to be timing: timing and close study of operating time, downtime, repairs and how much better the new models can compete.

On p 102 there is a discussion of the METRE method for replacing mining equipment; a guide to Obsolescence Avoidance, or What to Do Until the Psychiatrist Comes.

Speaking of time and timing, we're indebted to our friend "Dutch" Falkell of Kaiser Engineers for his definition of the Golden Age of Parenthood:

"—When they're too old for baby sitters
and too young to drive the car."

And while we're still on the subject of timing, we'd like to correct a misplacement of blame, to which *E&MJ* was a party. Last month we quoted the Alaskan TDM *Bulletin's* story of the unloading of a helicopter and the dire results of an unforseen meeting of 20 ft of drill steel and a whirling 'copter blade.

We quote the *Bulletin* again, offering only our own sympathy and complete agreement:

"In reporting that 'chopper' accident at Yakobi Island last month, we have been informed that we insulted the drilling crew. . . . It was the pilot who poked the steel into the spinning rotor, not the driller. . . . Our apologies to the drilling fraternity"

Great good news! This column's one and only crusade has received an all-important endorsement. Our constant readers are well aware that we fearlessly took a stand more than two years ago on the highly controversial question of the name for element 41.

There were those among us who feared a schism in the industry, who shied away from discussion of the inflammatory subject. But not we dedicated seekers after truth and justice!

Our first editorial stands elicited a flood of two approving letters—200% more than those in opposition. Once assured of the ground swell of public opinion we forged ahead.

And now the astute leadership of AIME has voted to refer to element 41 by the name it has had since it was discovered in 1801—columbium. Victory is ours!

1,000 Cu. Yd. per Hour Performance with 4 Cat Scraper-Tractor Combinations

Bucking weather and terrain, Cat DW20 Tractors with No. 456 Scrapers removed overburden on this uranium mining operation in Wyoming. The contractor used four DW20s to strip an average of 1,000 cu. yd. per hour.

W. N. McMurry, secretary-treasurer and co-owner of Rissler-McMurry of Casper, Wyoming: "I like the stability of the DW20!"

Mining uranium near Riverton, Wyoming, Rissler-McMurry used four Cat DW20s with matching No. 456 Scrapers to strip overburden at the lowest possible cost per cu. yd. This contractor, working for Vitro Minerals Corp., has utilized Caterpillar machines for 16 years. The owners like the stability, economy and power of their fast wheel scraper-tractor combinations for loading and hauling. They also relied on the rugged punch of a Cat D9 Tractor, a maneuverable D8 and a No. 12 Motor Grader to get the job done on schedule.

The DW20s excavated a 350,000 yd. pit—moving an average of 1,000 cu. yd./hr. Average depth of the pit was 66 ft., and material consisted of loosely consolidated sandstone and gravel plus cemented claystone in the pit's bottom. The DW20s handled a 600-ft. 10% ramp at one end of the pit with ease.

Now the new DW20 (Series F) rig is faster than ever and packs even more punch. Powered with a brand-new Caterpillar Engine, HP is increased to 320 (maximum output). At equal rimpulls, speeds are 10% greater. And torque rise is more than doubled compared to previous models. So the big wheel units give faster cycling for high production and wider profit margins. Combined with a Caterpillar LOWBOWL Scraper, the DW20 is the top earth-moving team for pit mining and other tough jobs.

For an on-the-job demonstration, get in touch with your nearby Caterpillar Dealer today. Find out for yourself if wheel tractors and scrapers can do your stripping more profitably than trucks and shovels.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

FIND YOUR CATERPILLAR DEALER IN THE YELLOW PAGES

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For more than twenty-five years more copper ore in the United States has been mined with Texaco lubricated equipment than with any other.

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It's a heavy load, a fast lift—but wire rope stays strong, longer, because it's fully protected by Texaco Crater

That's because Texaco Crater penetrates to seal the core. At the same time, it surrounds the strands and separates them with a tight protective film. This sturdy film protects the rope against internal and external friction—and wear. And because the film adheres so tightly to metal, it prevents corrosion and rusting.

This same lubricant does double-duty on open gears, too. It clings to the teeth, won't ball up or throw off, cushions against shock and heavy loads, and acts to prevent wear.

Operators who prefer the spray method of application use Texaco Crater X Fluid—for both wire rope and open gears. This outstanding, convenient product *goes* on as a liquid (no heating required), and *stays* on just like the regular Crater. Gives the same fine long-lasting protection.

Texaco Crater and its spray-on counterpart, Texaco Crater X Fluid, are only two of Texaco's complete line of famous products for mining equipment. Let a Texaco Representative help you draw up a Simplified Lubrication Plan for all your mining equipment. Call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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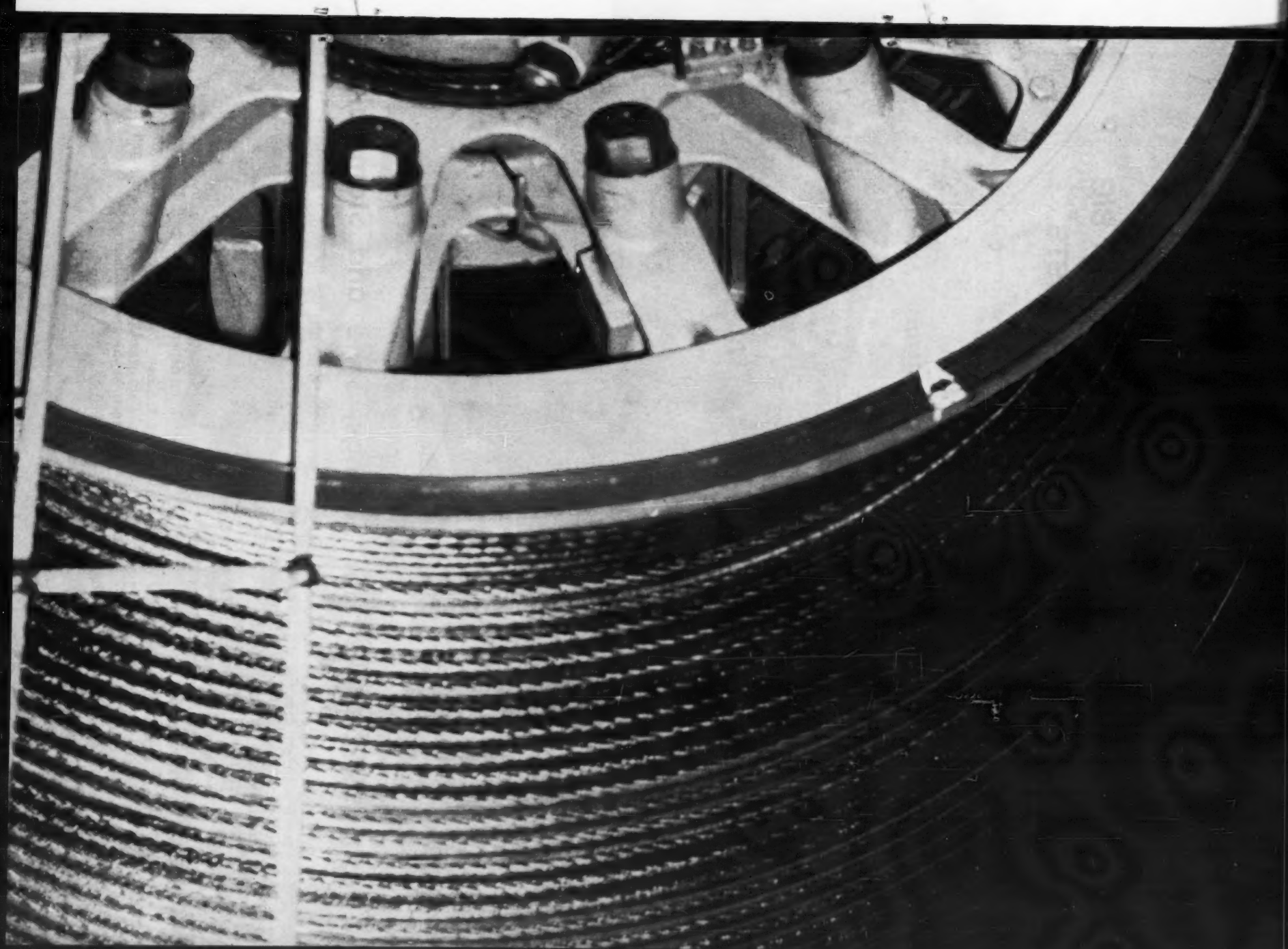
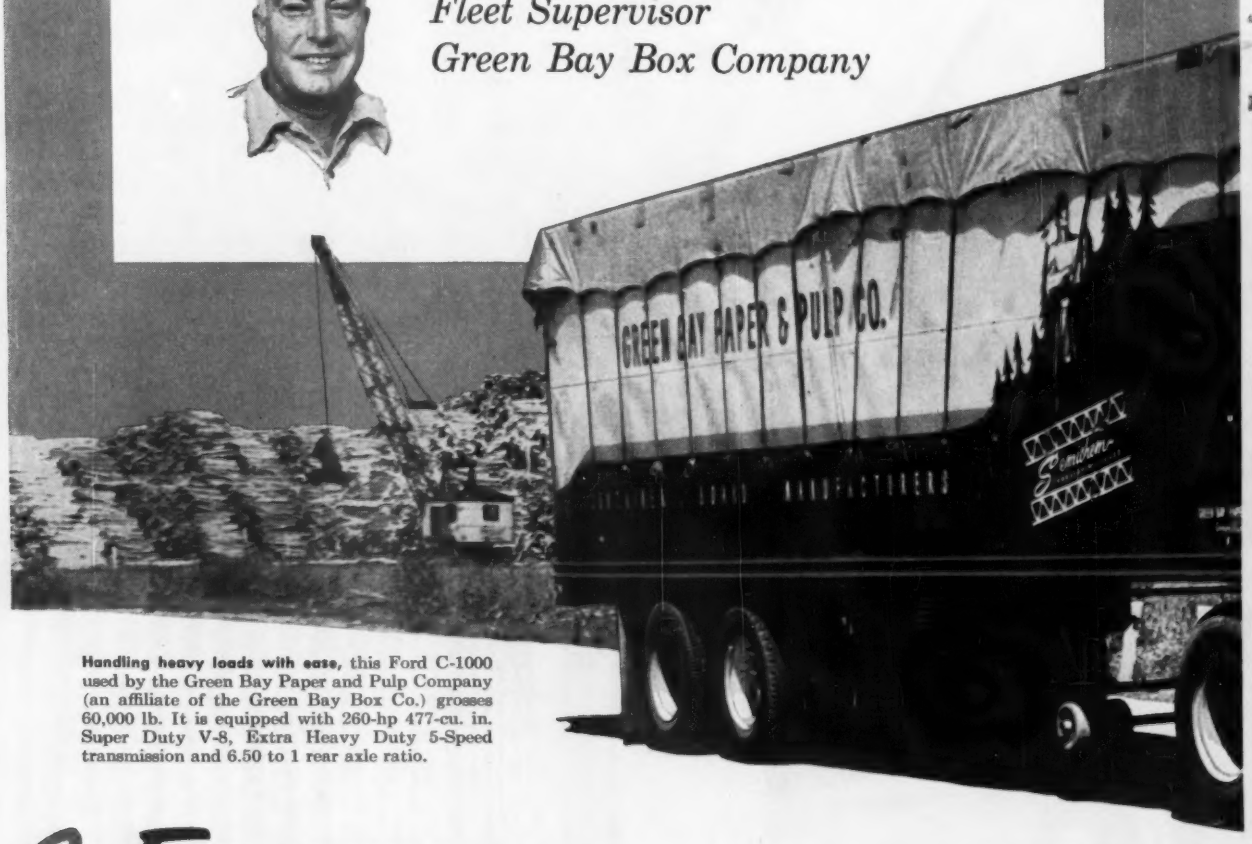
LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)



"USING FORD HEAVIES HAS MADE A BIG CUT IN OUR MAINTENANCE COSTS"

says Allen Grosse
Fleet Supervisor
Green Bay Box Company



Handling heavy loads with ease, this Ford C-1000 used by the Green Bay Paper and Pulp Company (an affiliate of the Green Bay Box Co.) grosses 60,000 lb. It is equipped with 260-hp 477-cu. in. Super Duty V-8, Extra Heavy Duty 5-Speed transmission and 6.50 to 1 rear axle ratio.

GO FORD-WARD for Savings, Style and Stamina!

Whatever your job . . . wherever you do it—you'll find Ford Heavies and Extra Heavies are engineered and built to do it better! And the '59 improvements in these models will bring still more benefits to your operation.

Greater operating economy with new, faster rear axle ratios and wide choice of transmissions.

More efficient parking brake of the internal expanding type has approximately 50% greater stopping and holding ability, requires less than half the operating effort needed for the previously used type.

Higher payloads and longer life with new, higher-capacity front and rear axle options.

Factory installed tractor package custom-fitted to Ford trucks for safer, more dependable braking.

Yes, the new '59 Ford trucks are here to take you *Ford*-ward for savings, *Ford*-ward for modern style and stamina. See your Ford Dealer today!

"Our records show that our average monthly parts cost, including major overhauls, has been reduced over 24%.

"Our Fords have given us less trouble than any other make of truck we've owned! Also, our Ford Dealer has always given us immediate and very good service. We've never had any downtime waiting for parts. They're always available at our Ford Dealer's, so we don't have the problem or expense of carrying a big parts inventory.

"Our drivers sure like the 'hillability' of the big Ford Tilts with their Super Duty V-8 engines! They say the 'Big V' has sure got it for power that seems to level out the steepest hills. And the Tilt Cabs are tops for maneuverability and riding ease.

"Performance plus economy . . . that's why we're sold on Ford trucks. We started using Fords when we opened our trucking department in 1954, and today 28 of our 35 trucks are Fords."

New Styleside pickups! Notice the handsome new grille, dual headlights, stronger wrap-around bumper. 6½-, 8- and 9-ft. boxes available in Styleside or Flareside models. Short Stroke Six or V-8 engines.

FORD TRUCKS COST LESS

LESS TO OWN . . . LESS TO RUN . . . LAST LONGER, TOO!

AT CEDAR CITY, UTAH . . .

Mine owners benefit from the drilling speed of Bucyrus-Erie rotary blast hole drills

Columbia Iron Mining Co.* has joined the long list of open pit mining companies across the country that are using Bucyrus-Erie rotary blast hole drills. Working at the company's Desert Mound Mine some 12 miles from Cedar City, the 40-R shown here is designed for drilling 6¾ to 9-in. holes.

Air bailing cools the bit and cleans out cuttings. By removing the need for water, the drill eliminates auxiliary equipment, cuts maintenance and labor costs when compared to older drilling methods. Heavy cuttings pile up around the hole, providing handy, excellent stemming material and permitting dry sampling. A remote-controlled, power-driven drill pipe rack reduces manual effort for changing drill pipe. Hydraulically powered down pressure on the bit provides controlled load on drilling tools for maximum penetration. Ward Leonard electric control on rotation of the drill pipe permits drilling at the most efficient speed for a given formation.

The 40-R at Cedar City is a full-electric rig (40-Rs are also available with diesel-electric power). For drilling 9⅞ to 12¼-in. holes, Bucyrus-Erie Company offers the 50-R with full-electric power.

Bucyrus-Erie rotaries can speed *your* drilling operations . . . cut your drilling costs. Write direct for detailed, illustrated literature. Bucyrus-Erie Company, South Milwaukee, Wisconsin. 72858C

*Subsidiary of Columbia-Geneva Steel Division, United States Steel Corporation.

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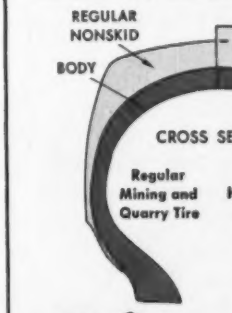


Like steel, tire cord must be tempered to be tough. Goodyear's exclusive 3-T process, involving Tension, Temperature and Time, triple-tempers cord to make it TRIPLE-TOUGH – to give you longest tire life, lowest cost-per-yard!

The new Hard Rock Lug XTRA TRED is a *specialist*. It has everything the famous Hard Rock Lug family ever had – plus what it takes to keep you rolling on your roughest jobs.

More tread rubber–delivers up to 50% longer tread life. Special, tough-formula rubber holds tread cuts to new LOWS. Bigger, reinforced lugs–burlier shoulders–huskier sidewalls–add new capability, new reliability.

And it's built with Triple-Tough 3-T Nylon Cord – the greatest tire *saver* in 23 years!

The new Hard Rock Lug XTRA TRED wants the toughest tread-wearing jobs you can offer. Visit your Goodyear dealer–and start it rolling up savings!

Goodyear, Truck Tire Dept., Akron 16, Ohio.

Xtra Tred–T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

60 YEARS

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

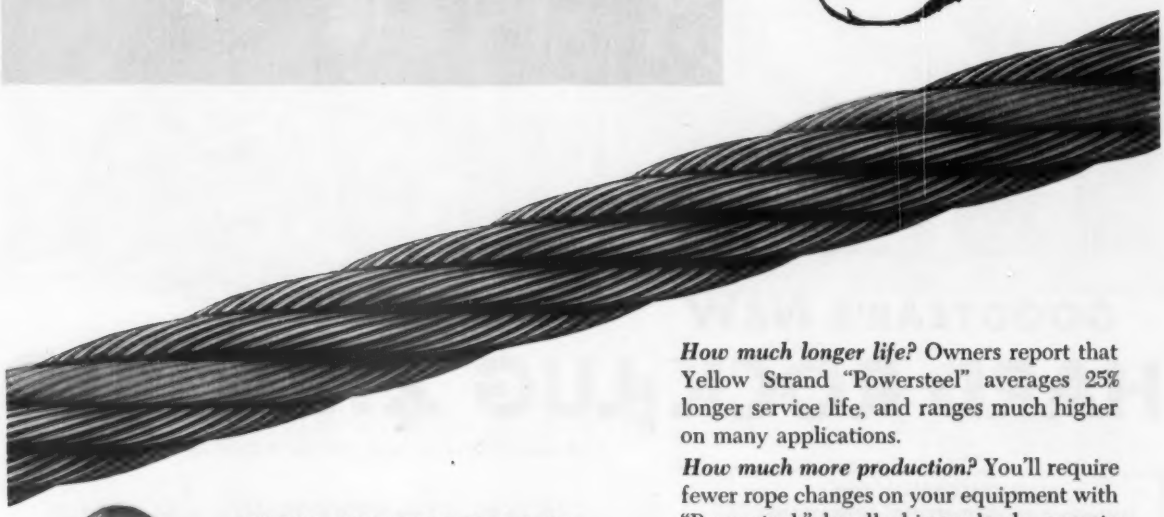
"POWERSTEEL"®

WIRE ROPE

PAYS OFF

Longer Life

Higher Production



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Ask for them at your Yellow Strand Wire Rope Distributor. Heavy-duty galvanized steel U-bolt. Drop-forged steel saddle, hot dip galvanized. Easily applied.

How much longer life? Owners report that Yellow Strand "Powersteel" averages 25% longer service life, and ranges much higher on many applications.

How much more production? You'll require fewer rope changes on your equipment with "Powersteel," handle bigger loads, operate larger machines. You'll get greater production and more profit . . . less "downtime" and lower operating costs!

"Powersteel" is an extra high-strength rope for heavy loads and abrasive conditions. It spools freely, resists wear and crushing, and was developed for your high speed, high production equipment.

Your nearby Broderick & Bascom Distributor stocks an ample supply of Yellow Strand "Powersteel." See him for complete details. Broderick & Bascom Rope Co., 4203 Union Boulevard, St. Louis 15, Mo.

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Quality WIRE ROPE since 1876

FAST FOOT WORK Can Make High Output Possible!

THE NORTHWEST 80-D, 2½-yd. Shovel is a *real* Hard Rock Rig. It is readily adaptable to the varied problems that occur in pit mining and quarry service.

There are three 80-Ds in the Santa Catalina Quarries of the Connolly Pacific Company, and they have to be nimble rigs. One of these is brand new, the 16th Northwest in the growth of this progressive outfit. The new Northwest replaced an old 80-D that had been in service since 1942 and had handled upwards to 5,000,000 tons of rock and Basalt.

The quarry face is 200 to 250 feet high and is almost solid rock. Rock is fractured by dynamite and then the shovels by loosening key boulders start landslides. The shovels and trucks must move quickly to escape the cascading rock and overburden.

Northwests are built for jobs like this—Northwests load fast and move fast! Plenty of power combines with the Northwest Dual Independent Crowd that utilizes force most independent crowd shovels waste to cut through a bank or handle heavy digging without "stuttering". Uniform Pressure Swing Clutches take the jerks and grabs out of swinging and make spotting accurate without losing time jockeying a load over the truck. The Cushion Clutch eliminates shock overloads before they reach machinery and the "Feather-Touch" Clutch Control gives the feel of the load and makes operation easy without resorting to pumps, compressors, and other delicate mechanism.

This is only part of the story. We would like to have you know the complete details on the size machine you need. Why not ask for a catalog?

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1509 Field Bldg., 135 South LaSalle St., Chicago 3, Ill.

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NORTHWEST *Always Ready to* GO

NORTHWEST EQUIPMENT IS BUILT IN THE FOLLOWING SIZES

SHOVELS	CRANES	DRAGLINES	PULLSHOVELS	TRUCK CRANES
¾ Yd. to 2½ Yd. Capacity	13-Ton to 50-Ton Capacity	¾ Yd. to 3 Yd. Capacity	¾ Yd. to 2½ Yd. Capacity	25-Ton and 35-Ton Capacity

S-D GISMO TRANSLOADER

AN ANNOUNCEMENT OF UNUSUAL IMPORTANCE!

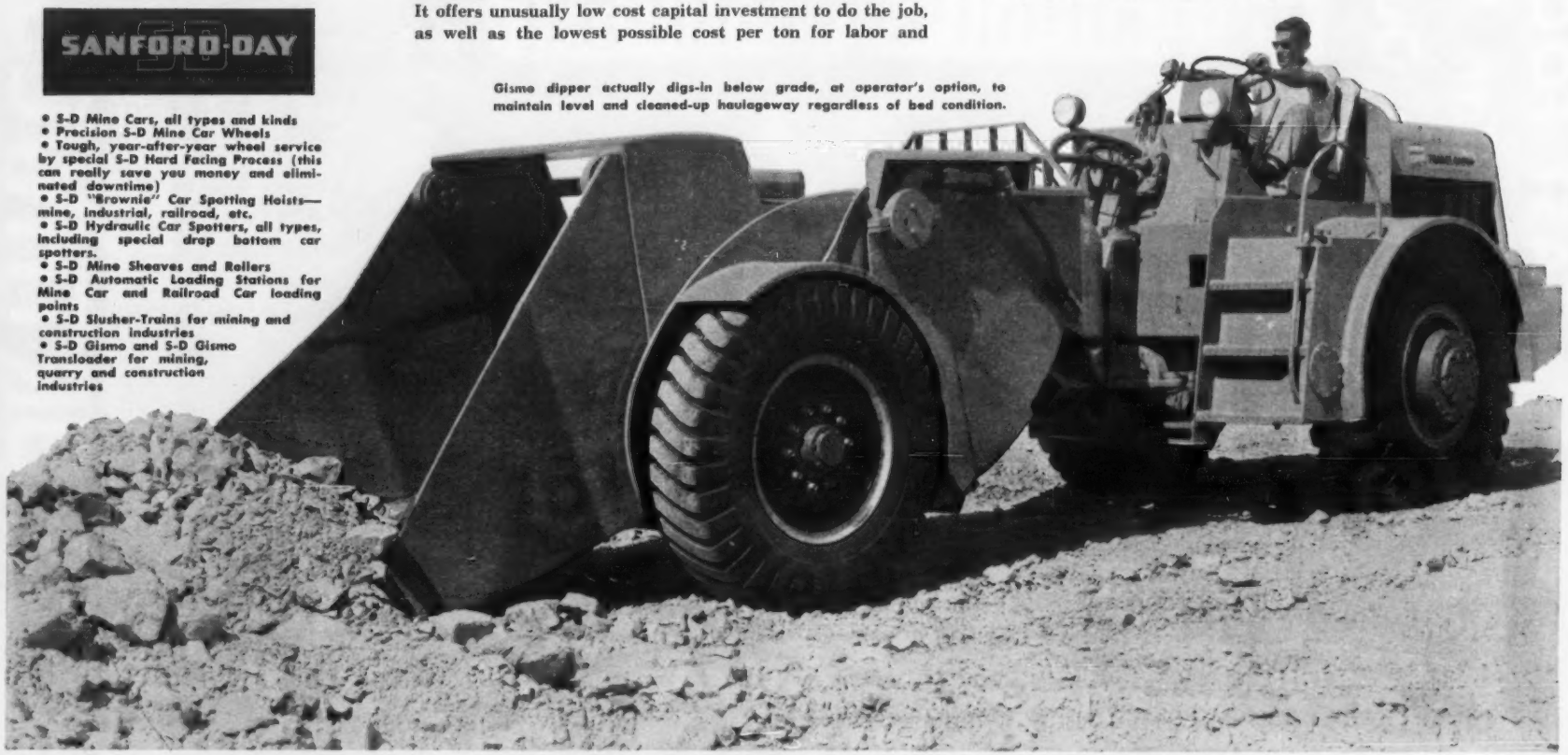
A Self-Loading... Self-Dumping Transport

THE GISMO TRANSLOADER is a one-man operated SELF-LOADING and SELF-DUMPING TRANSPORT . . . a self-loading truck that shuttles back-and-forth between muck pile and dumping point without the synchronization of several pieces of equipment or positioning of equipment to load. It WORKS FULL SHIFT — loading, transporting and dumping in continuous, uninterrupted performance-cycles! It offers unusually low cost capital investment to do the job, as well as the lowest possible cost per ton for labor and maintenance. The Gismo Transloader is an advanced equipment development . . . the perfectly natural result of the performance of the Gismo powered by crawler-mounted tractors conceived a few years ago and doing an outstanding job in mechanized mining today! Write today for complete literature and information. *Manufactured by Sanford-Day Iron Works, Inc., Knoxville, Tenn.*

SANFORD-DAY

- S-D Mine Cars, all types and kinds
- Precision S-D Mine Car Wheels
- Tough, year-after-year wheel service by special S-D Hard Facing Process (this can really save you money and eliminated downtime)
- S-D "Brownie" Car Spotting Hoists—mine, industrial, railroad, etc.
- S-D Hydraulic Car Spotters, all types, including special drop bottom car spotters.
- S-D Mine Sheaves and Rollers
- S-D Automatic Loading Stations for Mine Car and Railroad Car loading points
- S-D Slusher-Trains for mining and construction industries
- S-D Gismo and S-D Gismo Transloader for mining, quarry and construction industries

Gismo dipper actually digs-in below grade, at operator's option, to maintain level and cleaned-up haulageway regardless of bed condition.



This new high-speed, power-packed S-D GISMO TRANSLOADER is an entirely pneumatic-tired 4-wheel self-loading and self-dumping transport developed for long hauls, and featuring:

* HIGH SPEED TRANSPORTING . . . up to 20 miles per hour either direction—three speeds, forward or reverse with directional travel lever!

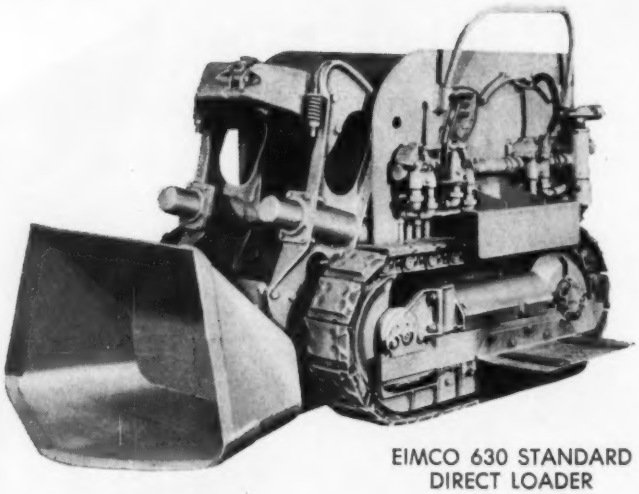
* NO TURNING or positioning for loading. Machine travels equally as well either direction!
* POSITIVE NO JACKKNIFING in mucking operation!
* POWER BRAKES . . . POWER STEERING . . . TORQUE CONVERTER!
* HAND-HANDY CONTROLS OPERATE DIPPER AND DUMP DOORS!
* PNEUMATIC TIRES to eliminate spring maintenance.
* OSCILLATING - COUPLING - UNIT ACTION and NO CONVENTIONAL STEERING MECHANISM usually associated with 4-wheel machines . . . therefore, less maintenance.

SANFORD-DAY

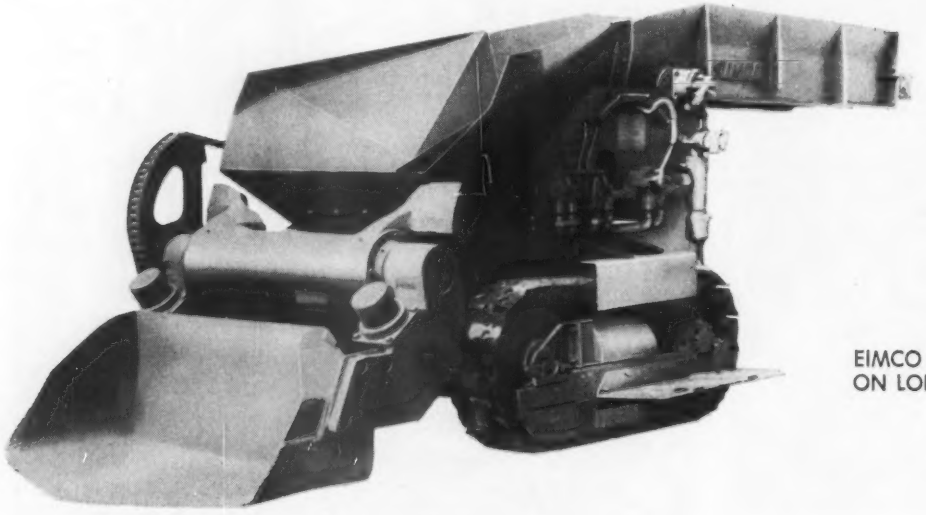
KNOXVILLE, TENNESSEE

Gismo Transloader backfills or dumps directly into bin or ore pass . . . or by simple ramps over trucks, cars, conveyors, etc. Also, moves large boulder rocks for secondary blasting.

TWO WAYS TO CUT LOADING COSTS



EIMCO 630 STANDARD
DIRECT LOADER



EIMCO 635 LOW HEADROOM
ON LONG CARS AND TRUCKS

We ask that when you consider underground loading equipment, you keep in mind the qualifications which only Eimco has — to give you, for any condition, the best machine for the job.

Eimco is not only the pioneer in the design and building of wheel and trackless mine loading machines, but it is also the oldest and the largest manufacturer in this field.

Your money can always buy a copy, but it will never work as hard or give you as much as when it's invested in a genuine Eimco machine.

The combination of Eimco's experienced engineering; its big, integrated world-wide manufacturing facilities; and its famous reputation for heavy, rugged construction make real and certain the claim — "You can't beat an Eimco."

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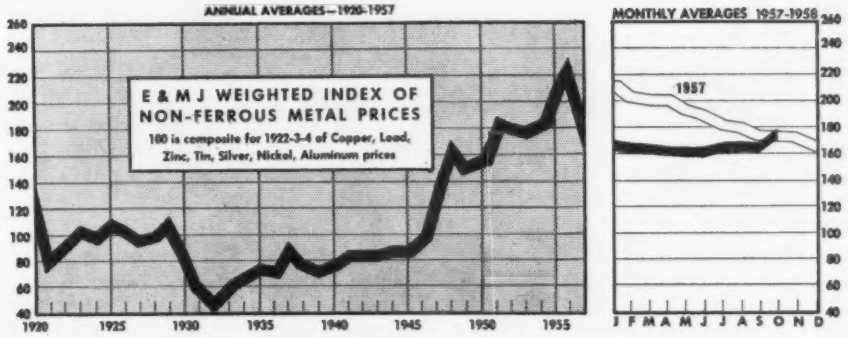
B-354

E&MJ OUTLOOK

PRICES


ANNUAL AVERAGES—1920-1957
E & M J WEIGHTED INDEX OF NON-FERROUS METAL PRICES
100 is composite for 1922-3-4 of Copper, Lead, Zinc, Tin, Silver, Nickel, Aluminum prices
MONTHLY AVERAGES 1957-1958
1957
J F M A M J J A S O N D

MARKETS

Substantial increases in the prices for copper, lead, zinc, tin and silver pushed E&MJ's nonferrous metals price index up nearly 10 units, from 168.29 for September to 178.00 for October.

●

AT HOME

A plan for acquisition of the assets of Consolidated Coppermines Corp. by Cerro de Pasco Corp. is expected to be submitted to the directors of both companies. Consolidated's ownership includes two copper fabricating plants of Titan Metal Manufacturing Co., and Rockbestos Products Corp.

AEC chairman John McCone reports that U. S. uranium needs through 1962 can be met by existing ore purchase contracts. In his opinion, the country could use a stockpile of uranium ore over and above current needs.

Bunker Hill Co. has announced plans for a $10-million fertilizer plant in the Pacific Northwest. It will go into production by July 1960. Capacity will be 200,000 tons of fertilizer products annually.

September housing starts in the U. S. hit an eight-year high for the month. Builders started work on 118,000 dwelling units.

Esso Research News reports that the fuel cell may replace steam power in the production of electricity. Today most operating power plants are only 42% efficient, whereas the hydrocarbon fuel cell can achieve an efficiency of 80%.

Humble Oil and Refining Co., whose main interest in Alaska is finding oil, has discovered and filed claims on iron ore deposits in the Dillingham area.

●

LABOR

International Union of Mine Mill and Smelter Workers will ask the 1959 Congress to provide free hospital and medical care for pensioners under the Social Security Act.

Employees of Homestake-New Mexico Partners and Homestake-Sapin Partners voted against union representation in National Labor Relations Board elections held at the mines and mills of the two companies near Grants, New Mexico. Three unions were seeking to represent employees.

●

ABROAD

Pan American Sulphur Co. shipped 582,000 tons of sulphur from its Mexico operation during the first nine months of 1958, as compared with 496,000 tons during the first nine months of 1957.

Cuba will become one of the world's top producers of nickel and cobalt within a year, according to Richard Colligan, vice president of Moa Bay Mining Co. The company is a subsidiary of Freeport Sulphur Co.

France will be recovering 1.2-million tons of sulphur annually from rich gas fields at Lacq.

Kaiser Industries is studying possibilities of establishing a steel plant, a shipyard and an aluminum smelter in Brazil, according to an announcement by Kaiser vice president, Chad Calhoun.

THIS MONTH IN MINING

PRINCIPAL SPEAKERS at the ceremony, presented in both French and English, included Robert D. Bradford (standing), president of Lake Asbestos, and Premier Maurice Duplessis, of the Province of Quebec (seated directly behind the speaker).

Asarco-Lake Asbestos Dedicate Black Lake Mine

FORMAL DEDICATION of the new Black Lake mine plant of Lake Asbestos of Quebec, Ltd. took place in mid-October at the mill building. Premier Maurice Duplessis of Quebec joined officials of the American Smelting & Refining Co. subsidiary, of the parent company, and other government officials on the dedication ceremony platform. The Provincial chief executive lauded the asbestos firm for its foresight in opening the submarine orebody and was lauded in turn for his administration's cooperation and encouragement toward a better mineral climate in Quebec and Canada.

Robert D. Bradford, vice president and a director of Asarco, is president of Lake Asbestos. Michael J. Messel, general manager of the Canadian company, officiated at the ceremony, which was attended by several hundred persons.

The $36-million facility (see *E&MJ*, January 1956) is designed to produce approximately 100,000 tons per year of asbestos fiber of all sizes from its $9.2-million mill and the deposit, which was formerly under a 2-mile by one-half mile lake.

The lake proper will not be finally drained until mid-1959, but Lake Asbestos began shipping some months ago, and will continue at near capacity by mining ore from benches above the water level.

Open pit mining is expected to continue for about 20 years, at which time the mine will go underground. Victor I. Mann, vice president of the firm, in a paper before the American Mining Congress in San Francisco in September, estimated reserves at 24.7-million tons "amenable to open cut operations." Total reserves announced by LAQ are estimated at 42-million tons.

Present mining is from the "A" and "C" orebodies in the evacuated lake bed, on 40-ft benches, 100 ft wide for working benches and 70 ft for inactive levels. The "A" pit, according to Mr. Mann, will ultimately be 2450x1400 ft in size and 600 ft deep; the "C" will be 1500- to 1800-ft in diameter and 680 ft deep. All ore must be hauled to the primary crusher by twenty 22-ton trucks.

Mr. Mann quoted performance for equipment in the mine for the year 1957 as follows:

Drilling: Self-propelled track mounted drills, 4½-in. piston diameter were used principally on upper benches. Machines drill 3-in. holes and average footage per shift has been 197.6 ft. Main production drills drill 4-in. holes and have averaged 156.8 ft on pioneering work. A down-the hole drill (6-in.) is being used for spots where granite intrudes the serpentine. The granite is hard and abrasive and average performance, electric driven, is 120 ft. In serpentine, the machine has exceeded 300 ft per shift.

Secondary drilling is done with a "travel-drill" (*E&MJ*, August 1958, p120) to break boulders. The machine is skid-mounted and electrically driven, with portable diesel driven compressors supplying air.

SECONDARY BLASTING follows use of a skid mounted travel drill at the face. (See *E&MJ, August 1958.*)

Blasting: For the serpentine, 40% Special Gelatine is used; in granite, both 40- and 60%. Use of ammonium nitrate has been limited because of the many wet holes. Average tons broken, including secondary blasting, per pound of powder is 3.15 in serpentine, 2.63 in granite.

Loading: Loading is by three 4-yd electric shovels and one 2½-yd diesel unit. Average loading rates, due to bad working conditions, have been low. Low, irregular banks, soft bottoms, the latter requiring timber mats and rock ballast, have held loading to 3,000 tons rock per shovel shift and about 3,300 tons overburden.

A tour of the mine by visitors at the ceremony in mid-October followed the ore from the pit through the 5,000-tpd plant. A Stephens-Adamson pan feeder delivers primary ore to a Traylor jaw crusher (48-60-in.). Tyler vibrating screens take the 6-in. product, sending plus 4-in. to a Symons cone crusher and undersize to the outdoor wet storage

stockpile, which has a capacity of 120,000 tons and serves as a surge pile and a blending site.

Underground reclaiming conveyors take the ore to 2-in. screens. Fines are dried in rotaries, oversize goes direct to the tertiary crusher in the mill, except when the larger ore is extremely wet, or contains large amounts of ice and snow. Two 5x12-ft Tyler vibrating screens (¾-in.) separate the dry ore, with plus material routed through a 5½-ft cone crusher and minus to a 20,000-capacity dry storage bin.

A blending surge bin at the head of the mill, equipped with Hardinge constant weight feeders, empties onto three rock lines, which in turn feed vibrating screens, with oversize (plus ½) going to a Hazemag impact crusher. Recovery of the highest grade, or long-fiber asbestos, takes place in the sections up to here. Subsequent crushing has a more severe action, would be harmful to long fibers.

Rock then goes to the fiberizer and on to grading screens, which have already received the longer fibers. (See flowsheet p 186.)

Predominant process in the mill is air separation of the fiber. Crushed ore is fed to the heavy shaking screens equipped with powerful air suction hoods. Air takes product to cyclones, with product as an underflow to the grading screens, which are again "cleaned by air." Dust goes to the huge collection room and air

(*Continued on p 186*)

Mining Calendar

Fourth Annual Symposium on Mining Research, Missouri School of Mines, Rolla, Mo., Nov. 13 and 14.

National Conference On Air Pollution, Washington, D.C., Nov. 18 to 20.

Minnesota Section, AIME, annual meeting, Hotel Duluth, Duluth, Minn., Jan. 12 to 14.

Tenth Plant Maintenance & Engineering Show, Public Auditorium, Cleveland, O., Jan. 26 to 29.

Ninth annual Governor's Industrial Safety Conference, Biltmore Hotel, Los Angeles, Calif., Feb. 5 and 6.

Centennial Celebration & Mining Convention, Colorado Mining Association, Denver, Feb. 5 to 7.

AIME annual meeting (San Francisco), St. Francis, Sheraton Palace and Sir Francis Drake Hotels, San Francisco, Calif., Feb. 15 to 19.

Symposium, "The Application of the FluoSolids Reactor to the Mineral Industry," Univ. of Ariz., Tucson, Feb. 23 to March 3.

Twenty-first American Power Conference, Illinois Institute of Technology, Hotel Sherman, Chicago, Ill., March 31 to April 2.

International Symposium, Physical Chemistry of Extractive Metallurgy, Pittsburgh, Pa., April 27, 1959.

(*This Month Continued on p 136*)

As We Went to Press . . .

A bauxite orebody of undetermined size and grade, located in the Belgian Congo between the river and the French frontier, is bringing added pressure to the disposition of the tremendous hydroelectric potential of the river.

The government of Belgium has been pushing for the hydro project at Inga, about 40 miles above the seaport of Matadi, which reportedly could be developed up to 40-million kw if demand were present. Numerous business combines, including Syndicate Aluminga (with French, British, U.S. and Canadian members) are reported to be studying development plans.

French Equatorial Africa is challenging the Inga development with a project plan for the Kouilou River, which they say is much nearer development, and which would include an aluminum plant.

Should the bauxite in the lower Congo prove as rich and large as early rumors held it to be, the decision would be expected to go to the Belgians, with participation by Societe Generale de Belgique, and investment of huge sums of money.

The Inga development, basis for the creation of a "smokeless Ruhr," would initially produce 1.5-million kw in stage one, 5-million in stage two, and then increase with demand.

Construction of a $3-million electrolytic zinc plant is reported planned by the government of Mexico at Irapuato City, Guanajuato State. Fifty-one percent of ownership will be held by the government, with the remainder in private hands.

Mexico's first four-nine plant, the new facility was viewed as an attempt by government to further encourage depressed lead and zinc mining within its borders. Initial capacity was reported to be scheduled at 30 to 40 tpd.

Second paragraph of Congress' act to change the dates for assessment work to Sept. 1-Sept. 1, instead of July 1-July 1, notes that assessment for the year 1958 will begin on noon of July 1, 1958 and continue to Sept. 1, 1959 at noon.

A full size zinc blast furnace will be installed at Penarroya Co.'s Noyelles Godault works, in northern France, according to reports from the Continent. The furnace is licensed by Imperial Smelting Corp. Ltd. (*E&MJ*, September 1958)

A $10-million fertilizer plant will be constructed in the Pacific Northwest by Bunker Hill Co. The 200,000 tons per year plant will produce the fertilizer (in 1960) as a by-product from Bunker Hill's sulphuric acid output at the Kellogg lead-zinc reduction plant.

The Administration is studying means of stepping up trade between Russia and her satellites and the West, in accordance with the general principle agreed to by the U.S. and her European allies, and Japan.

Major obstacles, along with some opposition to the plan on the part of U.S. business, is the type of commodities the Soviet is willing to trade. One of the biggest items is metals and minerals. Reports have already reached Washington that Russia is regretting the effects of her tin sales on Malaya, Indonesia and Bolivia.

WASHINGTON IMPACT

Highlights

WASHINGTON WON—The latest battle over Federal metal-mineral policy has ended. After more than three years of bitter wrangling which split the mining industries, cut across political party lines, and divided Government officials, the main issues are settled.

On the face of it, no one won the fight. Domestic producers failed to get either Administration or Congressional approval for a revival of war-born stockpiling programs, built-in trade protection, or other wide-scale price and market supports. On the other hand, trade and budget minded opponents of any new Federal aid for U.S. mines saw exploration and development programs stepped up, new opportunities for trade protection written into law, incentive purchases given stays of execution on a mineral-by-mineral basis, and important quotas granted the key metals, lead and zinc (see below).

In short, the Administration's favorite policy formula, a sort of middle-of-the-road flexibility, carried the day. This approach isn't new; it has been applied to many delicate and controversial "crises" over the past six years—foreign and domestic, political and economic. Even a month ago, few observers would have predicted either a political or economic victory for what Republican leaders like to call "dynamic conservatism." Washington appeared to be juggling issues in the metal-mineral policy debate like so many hot potatoes, attempting to buy time and sweat it out until next year.

Then, just when it needed it most, the Administration got a big assist. The commodity recession broke. Prices, markets, and equity stocks firmed up for copper, lead and zinc. Industry leaders began to see bright futures even for such troubled metals as aluminum, tin, titanium and tungsten. Washington's application of lead-zinc import quotas, tempered by continued efforts toward international export controls, hurried the upturn in these metals that some economists had long been predicting for the fourth quarter.

Disappointed critics on either side of the Administration's mining policy say the battle is not yet over. But the main issues are resolved:

- No new metal-mineral subsidy legislation. The Seaton-Murray plan is dead.
- Trade policy is set. What remains is a trial of new loopholes in the law—a looser escape clause, easier defense-essentiality protection, tighter anti-dumping restrictions. These will be tested on a case-by-case basis.
- Stockpiling is over. However, it will be allowed to die slowly.

How long and how well the Administration's solutions stand up depends on broader political and economic issues—Republican strength in Congress, a continued business upturn at home, economic progress in underdeveloped commodity-producing nations overseas, and U.S. success in the economic war with Russia.

LEAD-ZINC: A LOOSE END—After any battle, mop-up operations remain. The key question still unsettled in Washington's "new" metal mineral policy (see above) is this:

Will the Administration stick by its new import quotas on lead and zinc, or remove them in favor of an international export control system?

There's no doubt President Eisenhower favors the latter approach. Despite traditional U.S. unwillingness to enter cumbersome international commodity schemes, a workable, voluntary export curb system would be preferable in the Administration's eyes to a precedent-setting permanent application of import quotas which might undermine a basically liberal U.S. trade policy.

But there's also no question the White House will keep the new import curbs in effect until an international control system is both agreed to in principle and worked out in practice.

Hopes in Washington are high that this can be done. The United Nations Commodity Commission's special committee session at London last month laid the groundwork for international controls. The only solid dissenting voice was Canada's—again because of that country's traditional and official opposition to such plans in principle.

U. S. Offers More Money For Foreign Enterprise

FOREIGN MINING OPERATIONS will get a boost from Washington's expanded role in the field of international finance. This is one of the broad economic issues that now overshadows domestic mining policy (see Highlights).

The Administration is getting ready to beef up its participation in both world-wide and regional economic development programs, mainly as an answer to the threat of economic war with Russia and political and economic unrest in underdeveloped nations as underlined by the recent turmoil in the Arab world and the stoning of Vice-President Nixon in Latin America.

The U.S. Government took the lead at last month's meeting of the World Bank and International Monetary fund in New Delhi—proposing not only expanded bank and fund activities, but an international soft-currency lending agency as well. Added to this are continuing efforts at setting up a regional Arab development fund, a joint U.S.-Latin American bank, and regional common markets in Latin America, and perhaps Southeast Asia as well.

Not all of these plans will work out, none will take effect immediately. But they point to a trend toward greater U.S. activity in financing development projects overseas, and metal-mineral mining abroad is sure to benefit from the trend.

At the same time, there is considerable domestic political pressure for more participation by private U.S. firms in foreign-aid projects. The President's business advisory committee is currently working on a special study to recommend ways this can be done better. Therefore, Washington is moving toward giving both foreign and U.S. projects overseas a financial shot in the arm.

Customs Court Ruling Threatens Quota Plan

IMPORTANT IMPLICATIONS for metal-mineral escape clause cases before the U.S. Tariff Commission in a recent New York customs court ruling are getting a thorough mulling over by trade lawyers in Washington.

The customs court held that the President, in acting on Tariff Commission recommendations for higher tariffs or import quotas under the "escape clause" provision when domestic injury is threatened, must accept the Commission's findings in whole or not at all.

This means that if the decision is upheld, the White House can no longer modify Commission recommendations and grant less tariff relief than the trade agency suggests.

The key case in point is the important lead-zinc decision (see Highlights), in which the President granted quotas rec-

ommended by half of the Commission, but rejected higher tariffs called for by all six members in their split decision.

Protectionists have hailed the New York court ruling as a victory. They point out that political pressure on the White House is often strong to "do something" for an escape clause petitioner—as it was in the lead-zinc case. Under the new procedure, the President would be faced with granting all that the Commission recommended or nothing. In the past, the President has often accepted part of the Commission's suggested relief, rejected part of it.

But in the case of lead-zinc, as well as in the bicycle case before the customs court, the new ruling would kill what relief the President already has granted. The same would hold true for numerous other cases already disposed of.

Further, State Department staffers point out that other than domestic political pressures on the President would be heightened under the new procedure. Foreign allies who might swallow moderate tariff boosts would resist stronger protection often recommended by the Commission. There's even a question the Reciprocal Trade pacts with other countries would allow the President to go as far as the Commission might suggest.

The decision unquestionably will be appealed by the Government. It will take time, and is almost sure to reach the Supreme Court.

Also, the decision raises another point that applies to the recent lead-zinc case. While the customs court split 2-1 on the main issue, it also held unanimously that the bicycle case violated the law because the final decision came 13 months after the petition was filed, four months over the statutory time period. The lead-zinc case also dragged on past the legal nine-month limit.

Late Developments

NO TARIFF CUTS will be negotiated at the current meeting of the GATT (General Agreement on Tariffs and Trade) member nations in Geneva this month. Their main concern is to lay the groundwork for negotiations of a common external tariff schedule for the European Common Market—a job that won't start until next year and will take until 1962 to complete.

Another big concern of GATT this month is how to convince the West Germans to remove post-war import quotas, originally placed to protect the Deutsche mark. Now that Germany is financially in a sound position, other GATT members—led by the U.K. and U.S.—maintain import curbs are no longer needed for financial reasons. But the Germans recently slapped a new curb on coal imports solely on protectionist grounds.

Ironically, the U.S. opposition to German import curbs has been weakened by Washington's own imposition of lead-zinc import quotas.

Labor This Month

MINE-MILL'S TROUBLED FUTURE: The storm warnings are being raised for 1959 by Mine-Mill and Smelter Worker officials. Despite some bouts with the recession and unemployment this year, the union can expect some bigger fights in the next 12 months. Two big trouble points are bargaining and legal trials. Absent through most of 1958, they're returning in force.

The negotiating battle: Clues to mid-1959 contract negotiations come from the AFL-CIO United Steelworkers union. A bellwether bargaining point for Mine-Mill, the rival Steelworkers are talking big about new contracts, and the steel industry is talking equally tough. Big reason: steel has been paying a high-priced three-year contract through the recession and wants to be let up. But Dave McDonald's Steelworkers will be negotiating in a rising economy. One bargaining point beyond the wage advances will be a shorter workweek designed to cut the job loss to automation. The current spread-the-work idea of the USW is a "sabbatical" leave for workers of three months every five years. What happens to the Steelworkers is likely to follow through in nonferrous mining.

THE COURT TRIALS REVIVE: The breather in its legal troubles with the Government is almost over for MMSW. A trial date is set on the two-year old indictment against 14 Mine-Mill officials—present and former—on charges of violating the Taft-Hartley Act. Specifically, the Government accuses them of violating the non-Communist oath of the labor law. The union, while concerned about the trial, is especially wary of its length. Its leaders think it may drag out into spring negotiations and hurt Mine-Mill's bargaining position, and they warn members not to be distracted by it. The trial opens Jan. 19 in U.S. District Court in Denver.

UNION POST-ELECTION GOALS: With the new 86th Congress still two months away from office, officials of the Mine-Mill and Smelter Workers are shaping a new legislative campaign. Bolstered by a larger quota of "friendly to labor" Congressmen on Capitol Hill, they'll be seeking further Federal props for the non-ferrous mining industry. But what the MMSW leaders want most for the membership is another revision in the social security law. The hope is to improve on the last Congress' Social Security advance with a provision for free hospital and medical care for pensioners. The new Congressional line-up might do it.

LABOR TANGLES WITH AUTOMATION: Union leaders for the most part accept automation as an inevitable development of the economy—but they're resisting its effect on the unions themselves. Apart from the displacement of the worker by the machine, the new technology will cause an overhauling of the big industrial unions. Already, labor tacticians are working overtime against this "threat to our survival." The threat is the offshoot of automation that is changing the face of the workforce—from the production worker to the white collar employee.

Industrial unions concede they aren't set up to handle the advance of the white collar worker, both in numbers and influence. Already the production workers are outnumbered and in the next 10 years this gap will widen. Unless the industrial unions find a solution, they'll be an isolated and much less effective economic and political force. Labor strategists know the problem—sell the union to the white collar workers. This is their goal of the future, but the way to do it is their number one long-range problem.

RACKET PROBES REVIVE: Investigating labor racketeering isn't over—by a long shot. The Senate's McClellan anti-racket investigating committee and the AFL-CIO are both back in business of ferreting out union corruption. This will probably continue through most of 1959. On the AFL-CIO agenda are, among others, the carpenters, operating engineers, and hotel and restaurant employees. The McClellan committee will keep after the Teamsters and other building trades unions in particular and concentrate on the juke box, vending machines and related industries in the newest go-round.

MARKETS

Copper Prices Rise Sharply; Lead, Zinc, Tin Prices Up

THE E&MJ INDEX of nonferrous metal prices rose in October to 178% of the 1922-'24 average, from 168.29 in September. The increase in lead prices (the September average was 10.872c and in October it was 12.642c) contributed most to the rise and the copper price increase also was important. Zinc, silver and tin also were higher. Only nickel and aluminum among the prices included in the index failed to move up.

Copper prices rose vigorously in October. The U.S. average for September, f.o.b. refinery, was 26.081c per lb; the average in October was 27.31c. Prices for foreign copper reduced to the U.S. f.o.b. refinery basis by deducting ocean freight and insurance, were 25.489c in September and 28.573c in October. Katanga began the month at 27.225c per lb at main European ports and ended the month at 30.625c. London prompt bid the last day of September was £211¾; the first of November it was £257. Custom smelters were selling in the U.S. for delivery to U.S. fabricators at 26½c the last day of September; on October 31 they were at 30c a lb.

Strikes against the Rhodesian copper companies continued throughout October. (They were settled Nov. 4.)

About 55,000 tons of copper were lost by the end of October. On Oct. 31 workers rejected proposals that would have ended the strikes. The strike against the International Nickel properties in Canada (at the time of striking about 8,300 tpm) that began September 24 continued through October and at the end of the month prospects for ending it were not good. The strike at Kennecott's Chino property that began early in October was settled late in the month. The Phelps Dodge refinery at El Paso was struck October 18 and was settled October 31—about 10,000 tons of production was lost. The strikes scheduled against all metal companies in Mexico for October were postponed until November 14—the unions are suggesting wage rate increases of 25 or 35%.

Kennecott increased output several times in anticipation of increased demand and to meet better orders. The increases started in the summer when the company raised operating days from four to five; later it went to six and it recently announced it would go to seven days per week. These three increases probably represent about 13,800 tons per month. Phelps Dodge has increased output twice for a total of about 3,400 tpm. Anaconda is reported to have increased its output in the U.S. though no figures are available.

Sales of copper in the U.S. in October, according to the data supplied to *E&MJ* by all U.S. producers and custom smelters, will be somewhat greater than September (September had been the best month of the year). Other copper data support this view. The data supplied *E&MJ* for sales outside the U.S. in October suggest it is the best month of the year for sales with the possible exception of March (Copper Institute data show August better than March for deliveries abroad).

Stocks of refined copper in September dropped 60,189 tons; the U.S. accounted for 37,066 tons of this. These data reflected heavy shipments to fabricators and a drop in output. October data may show an equal drop in stocks. Blister copper stocks rose 6,564 tons.

Smelters' copper scrap intake had been low during most of October but late in the month was heavy as dealers released their accumulation to take advantage of the higher prices they had anticipated.

Higher prices in the U.S. later in the year appear probable. London is more than 3c higher than producers in the U.S. Most producers want higher prices and the belief is widespread that they will get them. Some factors say there will be heavy buying for tax purposes in connection with depleted inventories by fabricators.

Lead at New York hit 13c a lb October 15. A major custom smelter announced the new price October 14. Lead had been raised to 11½c September 30. On October 2 it went up to 12c and on October 8 to 12½c a lb. October sales reported to *E&MJ* were good though considerably under September. But some sellers had probably cut into their inventories and were selling material refined from intake that had cost more—in order not to incur losses they needed higher prices and the better sales and import quotas gave them the opportunity to raise them.

Shipments of lead to consumers in the U.S. in September were at the highest level since September 1957, according to the American Bureau of Metal Statistics. They were almost twice the low month of the year, April. Output rose somewhat and stocks about 1,300 tons.

Mexico replaced her export embargo on lead and zinc with an export quota for shipments to the U.S.

The UN is sponsoring another international conference on lead and zinc Nov. 6—11. The meetings will be in Geneva. A study group may be set up.

St. Joseph Lead Co. increased its schedule for its Missouri mines to five days per week from four. It will increase output by about 1,000 tpm.

Sales of zinc in October, according to the records submitted to *E&MJ* by U.S. zinc sellers, were probably the highest ever. They were about three times as heavy as for some months of this year. September was almost as good. Inventory replenishment in expectation of price increases was doubtless the major factor, but anticipation of better business also had a part. Possibly tax matters affected by inventories are involved. If this is correct then sales for the last two months of the year should at least equal consumption by fabricators.

A major custom smelter raised zinc to 10½c October 2; on October 8 it raised to 11c East St. Louis. Other sellers followed.

Zinc shipments in the U.S. in September rose to the highest tonnage since November 1957, according to data from the American Zinc Institute. Though there were no shipments to the Federal Government, deliveries of Prime Western, Intermediate and Special High were at records for the year. Total stocks dropped about 13,000 tons to 238,116.

Sales of aluminum were expected to rise as business recovery proceeded. The major question still is the extent to which they will exceed the drop in "puts" to the U.S. Government. Reports are that so far they have not offset the drop. The 180,000 production, annual rate, that Ormet is bringing in by January 1959, and the smaller output of Harvey, must also be reckoned in this evaluation.

Production figures for September failed to show much increase. Some primary producers had reported reopening potlines in the summer and early fall and along with Ormet's production some had assumed output would be up in September. Ormet put one line into operation in May, one in July and one in September—each has a capacity of 36,000 tons per year. A fourth is scheduled for November and the last for December or January. September's output was 124,713 tons and August was 125,416 tons, according to Aluminum Association; on a daily average basis September was 4,157 and August 4,046.

Barter of the U.S. Agriculture's grain surplus for metals may be near. Major controversy is the old one—shall metals processed in the U.S. be included. Agriculture holds that not only must the material originate abroad but it must also be processed there.

Tin prices in N.Y. rose about 2½c per lb in the course of October. London moved up about £12. Some factors believe prices are being supported for Straits quality tin. There are reports some buyers have changed to the lower grade A. Strength is attributed to three factors (all of which may be wrong): covering by shorts who had sold expecting a complete collapse of the ITC, buying by the USSR and expectation of a shortage by buyers owing to the sharp output cuts brought about by the ITC.

Average Prices October *(E&MJ Quotations)*

Copper:

Electrolytic, domestic refinery	27.310
Electrolytic, export refinery	28.573

Lead:

Common, New York	12.642
Common, St. Louis	12.442

Silver and sterling exchange:

Silver, New York, per oz.	89.966
Silver, London, pence per oz.	77.989
Sterling Exchange	280.705

Zinc:

Prime, Western, East St. Louis	11.338
Prime, Western, delivered (g)	10.838

Tin:

New York Straits	96.558
Gold, per oz., U. S. price	$35.000
Quicksilver, per flask	232.769
Antimony (E&MJ) (d)	32.590
Antimony, bulk, Laredo	29.000
Antimony, in cases, Laredo	29.500
Platinum, refined, per oz.	$57.000
Cadmium (a)	145.000
Cadmium (b)	145.000
Cadmium (c)	145.000
Aluminum, 99% plus ingot	26.800
Magnesium, ingot	35.250
Nickel (f)	74.000

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange checks, in cents. Quicksilver, per flask of 76 lb.

(a) Cadmium average based on the producers' quotations.

(b) Cadmium average based on the average of the producers' and platers' quotations.

(c) Cadmium average based on platers' quotation.

(d) Domestic 5 tons or more but less than carload lots, packed in case f.o.b. New York.

(f) Contract price, f.o.b. Port Colborne U.S. duty included.

(g) Delivered where freight exceeds 0.5c.

"Free" Gold Market

International gold markets gained 10¾% in volume. Bar gold listed minor variations; coins were generally off slightly. London and Paris showed increased activity as did some Far Eastern and African markets. Some small Russian gold sales were reported from Zurich. Private gold hoards throughout the world increased 3½% over last year, or $12.8-billion. Pick's World Currency Report quotes on "free gold" per fine oz as follows:

	COINS		BARS (12.5 kg)	
	Sept. 30	Oct. 31	Sept. 30	Oct. 31
NEW YORK, transit			$35.08⅛	$35.08⅛
MANILA	$42.25	$42.35	35.85	35.85
HONG KONG	45.50	46.00	38.25	37.90
BOMBAY	56.75	58.75	55.50	56.75
TANGIER	40.10	40.20	35.20	35.20
BEIRUT	41.75	40.65	35.24	35.23
PARIS	41.00	40.00	36.30	36.25
BUENOS AIRES	40.20	38.80	36.60	36.10

Note: Prices are quoted at the free or black market value of the U. S. dollar in the local markets.

Custom Smelter Copper Price

Based on flat price and E&MJ-average price sales in U. S. for month of October reported by American Smelting & Refining Co.: electrolytic copper in standard shapes, adjusted to nearest ⅛c; ¼c deducted for selling common.

Delivered Consumers' plant	29.125 lb
F.o.b. refinery	28.725 lb

Major Metals

U. S. DAILY AND AVERAGE PRICES

Oct. 1958	Electrolytic Copper (a) Domestic	Electrolytic Copper (b) Export	Lead New York	Lead St. Louis	Zinc (f) Delivered	Zinc East St. Louis	Aluminum Primary Pig 99%	Straits Tin New York
1	26.100	25.900	11.500	11.300	10.500	10.000	24.700	95.250
2	26.125	26.100	11.914	11.714	10.521	10.021	24.700	95.500
3	26.150	26.150	12.000	11.800	11.000	10.500	24.700	96.875
4	— No Market —		12.000	11.800	11.000	10.500	24.700	96.875
6	26.125	26.450	12.000	11.800	11.000	10.500	24.700	97.000
7	26.125	26.675	12.000	11.800	11.000	10.500	24.700	96.750
8	26.100	27.025	12.268	12.068	11.277	10.777	24.700	96.500
9	26.125	27.175	12.500	12.300	11.500	11.000	24.700	96.375
10	26.150	28.175	12.500	12.300	11.500	11.000	24.700	95.875
11	— No Market —		12.500	12.300	11.500	11.000	24.700	95.875
13	Holiday	29.075			Holiday			
14	27.125	28.825	12.500	12.300	11.500	11.000	24.700	95.875
15	27.300	28.975	13.000	12.800	11.500	11.000	24.700	96.125
16	27.125	28.900	13.000	12.800	11.500	11.000	24.700	95.875
17	27.150	29.400	13.000	12.800	11.500	11.000	24.700	96.000
18	— No Market —		13.000	12.800	11.500	11.000	24.700	96.000
20	27.425	29.625	13.000	12.800	11.500	11.000	24.700	96.625
21	27.175	29.625	13.000	12.800	11.500	11.000	24.700	96.875
22	27.375	29.950	13.000	12.800	11.500	11.000	24.700	96.375
23	28.575	29.550	13.000	12.800	11.500	11.000	24.700	96.875
24	28.775	29.475	13.000	12.800	11.500	11.000	24.700	97.125
25	— No Market —		13.000	12.800	11.500	11.000	24.700	97.125
27	28.725	29.925	13.000	12.800	11.500	11.000	24.700	97.125
28	28.700	30.000	13.000	12.800	11.500	11.000	24.700	97.125
29	28.800	30.025	13.000	12.800	11.500	11.000	24.700	97.375
30	28.825	30.000	13.000	12.800	11.500	11.000	24.700	97.250
31	28.750	30.175	13.000	12.800	11.500	11.000	24.700	97.875
AVERAGES FOR MONTH								
Oct.	27.310	28.573	12.642	12.442	11.338	10.838	24.700	96.558
AVERAGES FOR WEEK								
Oct.								
1	26.100	25.910	11.135	10.935	10.500	10.000	24.700	94.625
8	26.125	26.480	12.030	11.830	10.966	10.466	24.700	96.583
15	26.675	28.445	12.600	12.400	11.500	11.000	24.700	96.025
22	27.250	29.500	13.000	12.800	11.500	11.000	24.700	96.292
29	28.715	29.795	13.000	12.800	11.500	11.000	24.700	97.125
CALENDAR WEEK AVERAGES								
Oct.								
4	26.115	25.965	11.621	11.421	10.670	10.170	24.700	95.583
11	26.125	27.100	12.295	12.095	11.296	10.796	24.700	96.396
18	27.175	29.033	12.900	12.700	11.500	11.000	24.700	95.975
25	27.865	29.645	13.000	12.800	11.500	11.000	24.700	96.833

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.400c per pound, the average differential for delivery charges.

(b) Our export quotations for copper reflect prices obtaining in the open market and are based on sales in the foreign market reduced to the f.ob. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.125c for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingots; cathodes are sold at a discount of 0.125c to 0.15c per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East, Middle West, and West effective April 9, 1958, commanded a premium of 1c per pound over the current market for Prime Western; Special High Grade 1.25c effective April 9, 1958.

(f) Prime Western delivered where freight from E. St. Louis exceeds one-half cent.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points (almost all U. S. lead is corroding grade).

(c) The daily silver quotation reported by Handy & Harman, in cents and fractions of a cent per troy ounce, is the price paid by Handy & Harman in settlement for silver contained in unrefined silver-bearing materials submitted to them for refining. It is determined on the basis of offers of bar silver .999 fine as made to Handy & Harman for nearby delivery at New York by regular suppliers in quantities sufficient to meet daily requirements, and it is usually one quarter cent below the price at which such offers are made.

The Treasury's purchase price of newly mined domestic silver is 90.5 per troy ounce 1000 fine effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

Oct. 1958	Silver (c) New York	Silver London	Sterling Exchange	Gold London	Gold (d) United States
1	89.125	76.500d.	280.7500	250s. 2½d.	$35.00
2	89.125	76.500d.	280.7812	250s. 2½d.	35.00
3	89.125	76.500d.	280.7500	250s. 2½d.	35.00
4	(e)	(e)	(e)	(e)	35.00
6	89.125	76.750d.	280.7375	250s. 3⅛d.	35.00
7	89.125	77.125d.	280.8437	250s. 3½d.	35.00
8	89.125	77.625d.	280.8437	250s. 3d.	35.00
9	89.375	77.625d.	280.6250	250s. 4⅝d.	35.00
10	89.875	77.875d.	280.6875	250s. 4¼d.	35.00
11	(e)	(e)	(e)	(e)	35.00
13	Holiday	78.250d.	Holiday	250s. 3½d.	35.00
14	90.375	78.250d.	280.7500	250s. 2½d.	35.00
15	90.375	78.750d.	280.7812	250s. 1d.	35.00
16	90.375	78.750d.	280.7187	250s. ⅝d.	35.00
17	90.375	78.750d.	280.6562	250s. ¼d.	35.00
18	(e)	(e)	(e)	(e)	35.00
20	90.375	78.750d.	280.6562	250s. 1¼d.	35.00
21	90.375	78.750d.	280.7187	250s. 0d.	35.00
22	90.375	78.500d.	280.7187	249s. 11¾d.	35.00
23	90.375	78.500d.	280.7187	250s. 0d.	35.00
24	90.375	78.500d.	280.6562	250s. ¼d.	35.00
25	(e)	(e)	(e)	(e)	35.00
27	90.375	78.500d.	280.7187	250s. ¼d.	35.00
28	90.375	78.500d.	280.6125	250s. ¼d.	35.00
29	90.375	78.250d.	280.5937	250s. 1¼d.	35.00
30	90.375	78.250d.	280.5937	250s. 1¼d.	35.00
31	90.375	78.000d.	280.5937	250s. 1¾d.	35.00
AVERAGES FOR MONTH					
Oct.	89.966	77.989d.	280.705	—	35.00
AVERAGES FOR WEEK					
Oct.					
1	89.925	—	280.612	—	35.00
8	89.125	—	280.791	—	35.00
15	90.000	—	280.711	—	35.00
22	90.375	—	280.694	—	35.00
29	90.375	—	280.660	—	35.00

Calendar Week Averages: New York Silver: Oct. 4, 89.075; Oct. 11, 89.325; Oct. 18, 90.375; Oct. 25, 90.375.
(e) No Market (Saturday).

MARKETS (*Continued*)

London Metal Exchange Quotations

Oct.	COPPER Cash Bid	COPPER Cash Asked	COPPER 3 Mo. Bid	COPPER 3 Mo. Asked	LEAD Current Month Bid	LEAD Current Month Asked	LEAD 3 Mo. Bid	LEAD 3 Mo. Asked	ZINC Current Month Bid	ZINC Current Month Asked	ZINC 3 Mo. Bid	ZINC 3 Mo. Asked	TIN Cash Bid	TIN Cash Asked	TIN 3 Mo. Bid	TIN 3 Mo. Asked
1	213	213¼	213	213¼	71	71¼	72¼	72½	66	66¼	66½	66½	728	730	718	719
2	213¼	213½	213¼	213½	71½	71½	72½	72¾	66½	66¾	66¼	66½	729½	730	721	722
3	216¼	216½	216	216¼	73	73¼	72¾	73	67½	67¾	66¼	67	739	740	733	734
6	217¾	218	217	217½	72¾	72⅞	72⅞	73	67	67¼	66½	66¾	739	740	733	734
7	221	221½	219¼	219½	72½	72¾	72¾	72¾	66½	66¾	66	66¼	738	739	731	732
8	223½	223¾	219½	220	71½	71¾	72⅝	72½	66¾	67	66¼	66½	739	740	733	733½
9	227	228	222½	223	71	71¼	72⅝	72¾	67¼	67½	66¾	67	738	739	732	733
10	239	241	223½	224	71½	71¾	73¼	73½	68	68¼	67½	67½	732	733	728	729
13	240	241	230	231	71½	71¾	73	73¼	68¼	68½	67⅝	67¾	732	734	729	730
14	238½	239	232	232½	73	73¼	74¼	74⅜	69¾	70	69	69¼	735	736	730½	731
15	237	237½	230	230½	74¾	75	76½	76¾	72	72¼	70¾	71	744	745	737½	738
16	241½	242½	234	234½	76¾	77	77½	77¾	72¼	72½	71¼	71½	744	745	735	736
17	241½	242	234½	235	74½	75	75½	75½	70¾	71	70	70¼	738	739	734	734½
20	243	244	236½	237	76½	76¾	76¾	77	71¾	72	71	71¼	737	738	733	733½
21	250¼	251	243¾	244	77¼	77½	77¼	77½	72¼	72½	71½	72	740	742	736	737
22	245	246	238	238½	77¾	77½	76¾	77	72¾	73	71¾	72	740½	741	736½	737
23	240	241	233½	233¾	76	76¼	75¾	75¾	72¼	72½	71	71¼	743	744	738½	739
24	241½	242½	236¼	236½	75½	76	75¾	75½	72¾	72¾	70¾	71	747	749	742	742½
27	246½	247	239	239½	76	76¼	75½	75¾	73¼	73½	71¾	72	747	747½	744	745
28	247	248	237½	238	75¾	76	75½	75¾	74	74¼	72	72¼	749	750	745	746
29	246½	247½	236½	237	75	75¼	74¾	75	73¼	73½	71¾	71¾	749	751	745	746
30	246	246½	236¾	237	73¾	74	74	74¼	73¾	74¼	71½	71¾	749	750	746	747
31	251	252	237½	238	71¾	72	73¼	73½	74	74¼	71¾	71¾	749	750	748	748½
Av'g's	£236.288		£229.772		£74.049		£74.576		£70.467		£69.492		£740.837		£735.576	

Prices are for the official a.m. session in pounds sterling per ton of 2240lb. Copper basis wire bars, lead 99.97%, zinc 98% and tin min. 99.75%.

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipments, f.o.b. New York unless otherwise stated, tons of 2,000 lb. unless otherwise noted. St—short ton; lt—long ton. (p) duty paid.

MISCELLANEOUS METALS

October 31, 1958

Aluminum ingot, 99 plus % lb.		26.8¢
Antimony, spot, lb., less than carload, in cases		32.59¢
In bulk, carload lots, f.o.b. Laredo		29.00¢
Imported, 10 ton min. (p), 99½%		24¢
Bismuth, ton lots, lb.		$2.25
Cadmium, commercial sticks, delivered, lb.		$1.45
Calcium, lb., ton lots, 98%, cast		$2.05
Chromium, 97% grade, lb., contract del.		$1.29
Cobalt, 97 to 99%, per lb. eff. Feb. 1, 1957		$2.00
Germanium, per gram, 10,000 gram lots	(c)37¢ —	(d)40.2¢
Indium, troy oz.	$1.25 @	$2.25
Lithium, lb., 98%	$9.00 @	$11.00
Nickel, cathodes, lb. (a)		74¢
Other sales, reg. sellers		74¢
Sales by dealers, etc.		74¢
Magnesium, 99.8% carloads, lb. producer's plants, Velasco, Texas eff. Apr. 16		35¼¢
Palladium, troy oz.	$15.00 @	$17.00
Platinum (wholesale lots), troy oz.	$54 @	$60
Quicksilver, flask of 76 lb., 25 flasks or more	$231 @	$234
Selenium, 99 plus %, lb.—(Feb. 19, 1958)		$7.00
Silicon, minimum 97%, carloads, lb.		21½¢
Semi Conductor grade, lb.		$350
Tellurium, lb.		$1.65
Thallium, 100 lb. or more lb.		$7.50
Titanium, 99.3 plus, grade A-1, max. 3% iron, lb. (b)	$1.62 @	$1.82

(a) Eff. Dec. 6, 1956; incl. U. S. duty; (b) Effective Oct. 1, 1958. (c) Delivered; (d) f.o.b. plant.

METALLIC ORES

Beryllium Ore, imported, 10% BeO, per short ton unit	(a)$28 @	(a)$35
Chrome Ore per long ton, f.o.b. cars Atl. ports, dry:		
44% Cr_2O_3 no ratio	$22 @	$23
48% Cr_2O_3 3 to 1 ratio	(a)$44 @	$46
Iron Ore, Lake Superior, Lower Lake ports, long ton:		
Old Range bessemer		$11.85(e)
Mesabi bessemer		$11.60(e)
Mesabi, non bessemer		$11.45(e)
Lead (Galena), 80%, Joplin, Mo., ton		$156.12
Manganese Ore—Per long ton unit of Mn basis 48% manganese, nearby positions, subject to premiums and penalties, c.i.f. U. S. ports, import duty extra, export duty included, $1.05 @ $1.10; both duties excluded, $.915 @ $.965. Long-term contract nominal.		
Molybdenum Ore, 90%, per lb. of Mo f.o.b. mines	$1.18 @	$1.23
Columbium-Tantalum, per lb., combined oxides 10 to 1 ratio	$1.05 @	$1.10
Tungsten Ore, per stu of WO_3:		
Foreign 60%, c.i.f. U. S. ports, duty extra	$8.25 @	$8.50
U. S. scheelite, f.o.b. mill	$16 @	(a)$22
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines		31¢
Zinc Ore, Prime, 60% concentrate, Joplin, Mo., per ton.		$64

(a) Nominal. (e) Eff. 1958 shipping season.

METALLIC COMPOUNDS

Arsenous Oxide (arsenic trioxide) lb., in bbl. carload lots delivered		5½¢
Cobalt Oxide, 72½% to 73½%, per lb. eff. Dec. 1, '56	$1.52 @	$1.55
Copper Sulphate, 100 lb. eff. Oct. 24, '58		$11.65
Germanium Oxide, gram		27½¢
Molybdic trioxide, technical, per lb. of Mo	$1.38 @	$1.39
Imported, incl. 37¢ duty	$.75 @	$2.05

ALLOYS

Ferrochrome 65 to 70%, per lb. of Cr. (4-9% C)		28¾¢
Ferromanganese, 74 to 76%, per lb., shipg. pt.		12¼¢
Ferromolybdenum, 58 to 64% Mo lb. of Mo contained	$1.68 @	$1.74
Ferrosilicon, 50% per lb. of Si f.o.b. shipping point (3-1957)		14.60¢
Ferrotungsten, 72 to 82%, lb. of W contained		$2.15
Ferrovanadium, per lb. of V delivered	$3.20 @	$3.40
Silicomanganese, max. 1¾% carbon, lb. contracts		12.8¢
Spiegeleisen, per long ton, 10 @ 21% grade eff. Jan. 7		$102.50

NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (Canadian funds) ton:		
Crude No. 1	$1,470 @	$1,810
Crude No. 2	$788 @	$1,155
Spinning fibers	$353 @	$593
Shingle fibers	$190 @	$220
Paper stock	$120 @	$142
Waste	$82 @	$86
Shorts	$27 @	$75
Asbestos, f.o.b., Vancouver, B. C. (Canadian funds):		
Crude No. 1		$1,522
Spinning fibers	$494 @	$787
Shingle fibers	$142 @	$325
Asbestos, Vermont, f.o.b. Hyde Park:		
Spinning fibers	$353 @	$383
Shingle stock	$172 @	$190
Paper stock	$114 @	$145
Waste, stucco or plaster		$82
Refuse or Shorts	$39 @	$72
Barytes f.o.b. cars:		
Georgia, crude, per ton		$18
Missouri, 94% $BaSO_4$, per short ton	$16 @	$18
Crude oil well grade, min. 4.3% sp. gravity, st (a)		$18
Imported, c.i.f. Gulf Ports, st.	$16 @	$18
Bauxite, long ton, f.o.b. point of shipment:		
Domestic, crude, 50 to 52% (not dried) (c)	$ 5.00 @	$5.50
Domestic, chemical, 55 to 58% (c)	$ 8.00 @	$8.50
Domestic, abrasive, 80 to 84 % (c)	$18.00 @	$18.50
Imported metallurgical, per lt, f.o.b. Br. Guiana, dep. on grade		$7.14
Feldspar, bulk ton:		
Potash or soda feldspar, 200 mesh, ceramic grade	$18.50 @	$22.50
Glass feldspar, white, 20 mesh	$10 @	$12.50
Fluorspar, f.o.b. mines, bulk, 72½% effective, ton	$37 @	$41
60% effective CaF_2	$33 @	$36.50
Acid 97% concentrate, bulk, ton (eff. 12-1-56)		$50.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00 @	$14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington		$46
Mica—Domestic, f.o.b. mines. Punch 7¢ to 12¢ per lb. according to size and quality. Sheet clear 1½ x 2-inch, 70¢ to $1.10; 2 x 2-inch, $1.10 to $1.60; 2 x 3-inch, $1.60 @ $2.10; 3 x 3-inch, $1.80 @ $2.30; 3 x 4-inch, $2.00 @ $2.60; 3 x 5-inch, $2.60 @ $3.00; 4 x 6-inch, $2.75 @ $4.00; 6 x 8-inch, $4.00 @ $8.00. Wet ground, very fine, $140 @ $155 per ton. Bulk sales, dry ground; $30 @ $55 per ton. Scrap, $20 @ $30.		
Ocher, Georgia, ton in sacks	$26.50 @	$32.00
Pyrites, Spanish, per long ton unit of S. c.i.f. atlantic ports		Not quoted
Sulphur, per lt. f.o.b. U. S. mines: bright		$23.50
dark		$22.50
Mexican, for use in Mexico, per metric ton, f.o.b. mines, 280 to 395 pesos, depending on use	$22.40 @	$31.60
For export f.o.b. vessel, lt. dep. on grade	$22 @	$24
Talc, f.o.b. works, ton:		
New York, purified	$18.00 @	$20.00
Vermont, extra fine		$12.50
Tripoli, Missouri, ton:		
40-mesh, cream colored		$50.00

(a) Some restricted sales at $11.50. (b) Corrected. (c) Nominal.

IRON AND STEEL

Pig Iron, gross ton, basic, Valley Furnaces		$66.00
Steel, f.o.b. Pittsburgh, billets, net ton		$80.00
Structural shapes, Pa., Ala., etc. 100 lb.	$5.30 @	$5.50

Helping to "HOLD THAT ROOF!"

O-B SHELLS AND PLUGS

"Hold That Roof!" is the title of a 27-minute, sound-color film produced by Ohio Brass to promote a better understanding of bolting principles and practices among underground production workers and bolting crews.

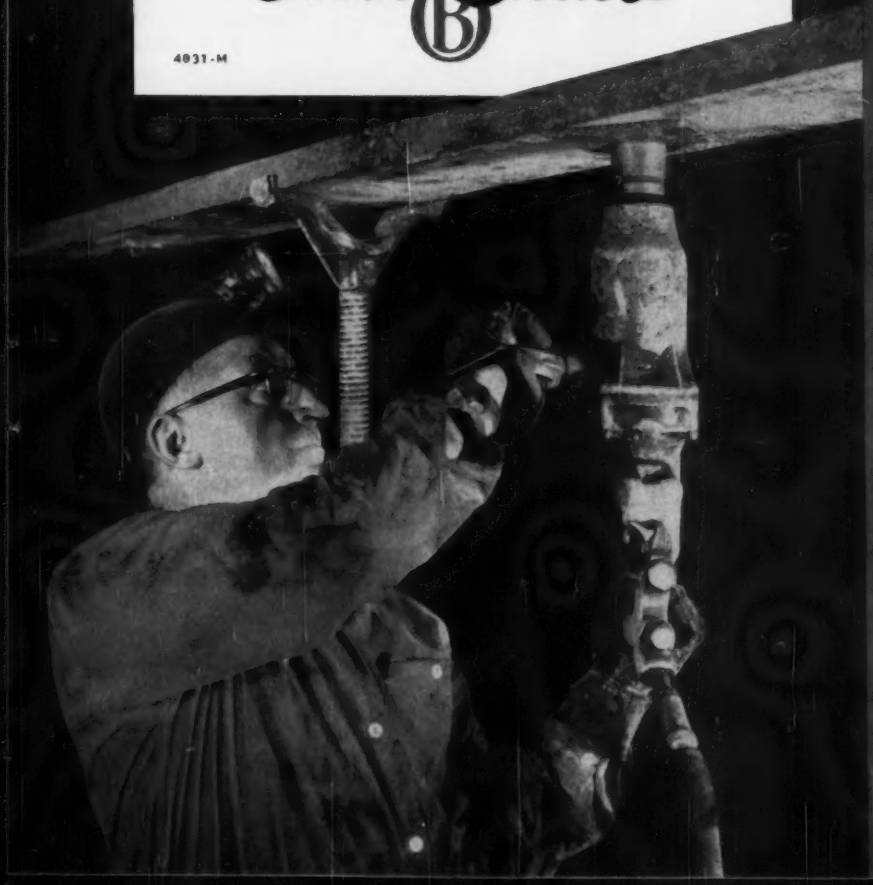
The film, which has already been shown to over 10,000 mining men, is available through local O-B representatives for scheduled showings at individual mine properties.

Why not ask your O-B representative for a "preview" showing to see how "Hold That Roof!" will fit into your bolting training program or safety campaign?

OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co. Ltd., Niagara Falls, Ont.

Ohio Brass

4831-M



have your bolting crews seen it yet?

"hold that roof!"
"suggested installation procedures for safe roof bolting"

a 27-minute sound-color film produced by Ohio Brass Co.

available through local O-B representatives for showings on your own property

already viewed by over 10,000 mining men!

see your O-B representative or write direct to Ohio Brass Co.

KOEHRING WORK CAPACITY *in action...*

Mining phosphate — After stripping overburden from a deep vein, a Koehring® 605 dragline (left) loaded phosphate out of the narrow cut. On this type of operation, the big 605 can be used with 50 to 110 feet of boom — and handles 1½ to 2½-cu. yd. dragline bucket, depending on weight of materials. (Check its other work capacities in chart on the next page.)

Heavy-duty 2-yard — Here is another Koehring size worth looking into — the 2-yard 805, with 25-foot deep-section shovel boom and 18½-foot dual dipper sticks. Fully convertible to clamshell for stockpiling, or dragline for stripping — handles 2 to 3-yard buckets on 50 to 150-foot boom. The 805 does your heavy lifting, too — safely handles loads up to 52 tons!

Introducing . . . the new 435

Now, Koehring brings you 35 tons of lift capacity, plus high-speed mobility on rubber, for lifting, material-handling, general utility and maintenance work around mines, quarries. It's the new 435 truck crane (shown above). Big, rugged — yet, is quickly convertible from fully-equipped crane to roadable machine for highway travel.

Quick facts on KOEHRING WORK CAPACITY:

ON RUBBER

MODEL	TYPE OF MOUNTING	CRANE LIFT CAPACITIES (Rubber-tired machines rated at 85% of tipping load.)	
208	3-axle truck, or 21.5 mph Cruiser	30,000 lbs.	at 12-ft. radius
305	3-axle truck, or 18 mph Cruiser	50,000 lbs.	at 12-ft. radius
425	4-axle truck	70,000 lbs.	at 15-ft. radius
545	4-axle truck	90,000 lbs.	at 15-ft. radius

ON CRAWLERS

MODEL	Size shovel	CRANE LIFT CAPACITIES (Crawler ratings based on 75% of tipping load.)	
208	½ Cu. Yd.	30,000 lbs.	at 10-ft. radius
305	¾ Cu. Yd.	30,000 lbs.	at 12-ft. radius
405	1 Cu. Yd.	40,000 lbs.	at 12-ft. radius
545	(Crane only — 85% rating)	90,000 lbs.	at 12-ft. radius
605	1½ Cu. Yds.	72,300 lbs.	at 12-ft. radius
805	2 Cu. Yds.	104,200 lbs.	at 12-ft. radius
1205	3 Cu. Yds.	190,000 lbs.	at 12-ft. radius

Extra lift capacity means . . . MORE WORK CAPACITY WITH ALL ATTACHMENTS

Dumping height: 40 feet-10 in. —

Owner of this strip mine needed a long-reach shovel — brought in a Koehring high-lift 1205, equipped with 2½-yard dipper on *50-foot* boom. Working with boom at 45° angle, it has a cutting height of 51 feet-4 inches — and dumps at heights up to 40 feet-10 inches. This big 1205 is also available with *3-yard* dipper on 40-foot high-lift boom — or as a standard 3-yard with 30-foot shovel boom for toughest digging. Its power, strength and load-stability as a shovel pay off in *extra work capacity* with all attachments. Takes 3 to 4-yard dragline or clamshell buckets on 60 to 170-foot boom—has 95-ton capacity as a lift crane (based on 75% rating). Koehring distributor has complete details on this, and other sizes. Call him today.

KOEHRING

DIVISION OF KOEHRING CO.

Milwaukee 16, Wisconsin

Koehring excavators and cranes also manufactured in:

CANADA • ENGLAND • SPAIN • JAPAN K807

CHEMICAL "TOOLS" *make mining industry news*

Chemical processes for cutting costs and increasing profits are constantly moving from the developmental stage into the production stage. In a relatively short time, two such processes have proved their value to mining men by the acid test of usage in the field. These new metallurgical tools—ion exchange resins and chelating agents—provide new effectiveness and economy in an area where they've long been needed. Pertinent facts on these and other Dow mining chemicals are briefed below for rapid dollars-and-cents reading.

You may wish to check certain items in this advertisement and forward to those concerned in your company.

Route to:

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ION EXCHANGE YIELDS HIGH RETURNS

Many metallurgists now tackle the exacting business of recovering metal from ore with the same basic process that softens water in homes. No longer a novelty, ion exchange resins are earning their keep throughout the mining world.

The basic concept of ion exchange is not new to metallurgists—transfer of ions is the basis of many metallurgical reactions. In ion exchange processing, metals are chemically separated from pregnant solutions and concentrated as a result of such a reaction. This is accomplished by contacting tl.e pregnant solution with an exchange bed of water-insoluble ion exchange resins. Metal ions are then exchanged for ions in the resin and thus concentrated.

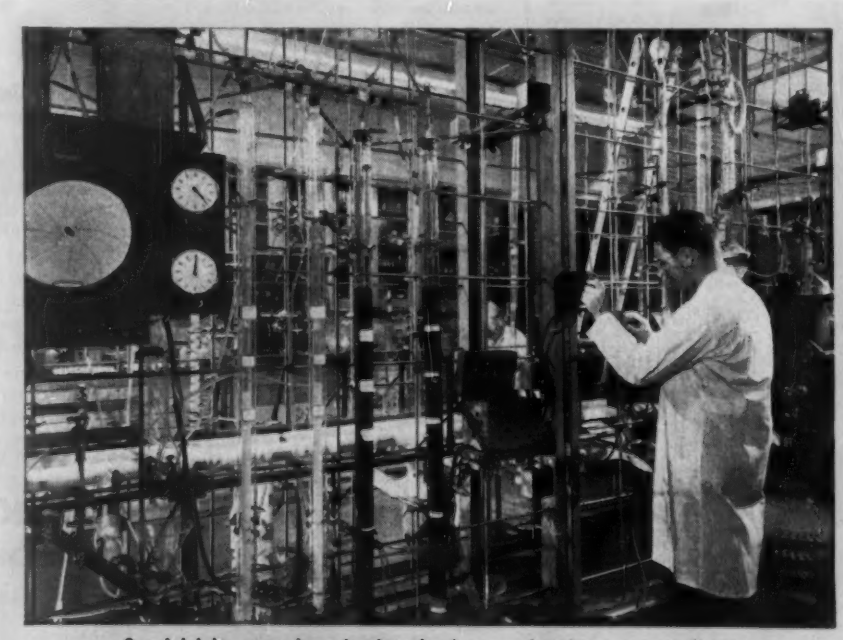
Recovering lost metal values. Generally speaking, there are three areas in which ion exchange can be profitably employed. (1) Where metal values are being recovered by less economical methods. (2) Where metal values are being lost. (In many cases, ion exchange is used in a supplementary role to obtain additional yield from solutions already processed by other methods.) (3) Where recovery of metal values is otherwise economically impractical.

Higher grade, lower cost. The use of ion exchange resins in recovering uranium has been tested and proved in the field under widely diverse operating conditions. In the U. S., Canada and South Africa, uranium processors are using these remarkable plastic "beads".

Several "standard" ion exchange resins (all trademarked Dowex®) are available to the mining industry from Dow including the well-known Dowex 1, Dowex 11 and Dowex 21K. Field tests with metallic ores are constantly in progress and developmental programs are now under way to provide specialized ion exchange resins for particular applications. Dow has issued a standing invitation to the mining industry to bring its recovery problems to the attention of Dow technical men.

Dow laboratories are equipped to aid individual processors on specific ion exchange problems. And Dow has built up a wealth of experience and know-how on the subject over the years.

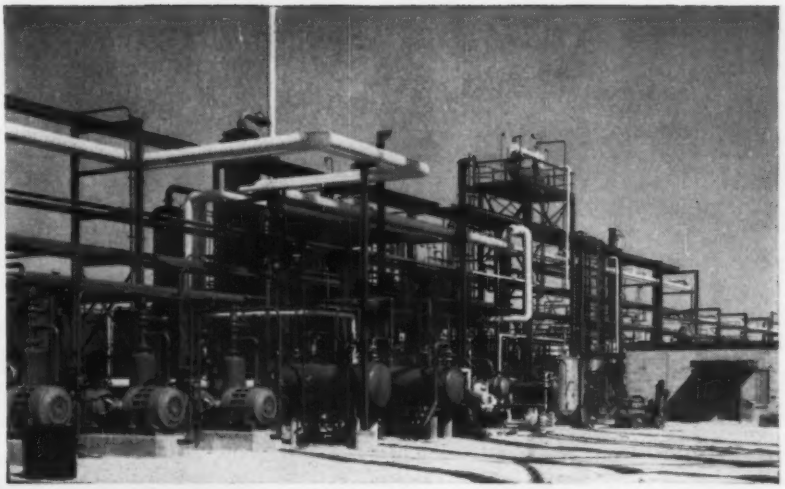
Lanthanide rare earths. One new developmental area shows excellent promise for the immediate future: separation of minor metals from pregnant



Special laboratory investigations lead to product improvement. Recent examples are the two new ion exchange resins, Dowex 21K and 21K RIP.

liquor solutions. Columbium and tantalum and the rare earths have been successfully separated in commercial quantities. The entire Lanthanide series of rare earths plus scandium and yttrium have been fractionated commercially by ion exchange. And these developments have barely scratched the surface of potential uses.

A new technical study on ion exchange is now being prepared at Dow. Soon to be published, this comprehensive work will serve as a basic text on ion exchange. You are urged to use this new book for reference. To reserve your copy, write to the address below on your company letterhead. You will receive a copy of the new book as soon as it is available.



New Texas plant offers customers better service on chelating agents.

VERSENE—

chelation value and volume

Metallurgists who use the curious chemistry of chelation in their processing are happy to note the increasing economy of Versene® 100 (trademark of Dow's most versatile chelating agent). Others may interpret the trend to mean that now is a good time to try this versatile chelating agent.

Although relatively new in the mining chemical lineup, Versene 100 has established itself as an excellent filter cloth cleaner and descaler by its ability to inactivate certain metal ions. New Dow production facilities in Texas assure abundant supply of the industry's widest range of chelating agents.

XANTHATES—*nine roads to recovery*

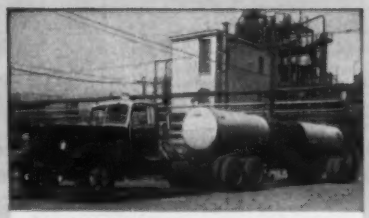
Any time you can make a metallurgist's efforts more effective, you're doing him a big favor. That's why Dow Xanthates are so popular in mineral recovery operations. These highly selective collectors—there are nine of them in all—do a topnotch job. Dow Xanthates are a favorite of the men who handle them, too. That's because they're in pellet form. No dust—and no waste, either! Makes for both handling ease and economy.

"Flotation Fundamentals" is the Dow handbook on mining chemicals. The new 108-page edition, just out, thoroughly discusses Xanthates and other Dow mining chemicals such as Dowfroth® and Separan®. Also included are sections on ore testing, milling calculations and interpretation of comparative metallurgical data. A sixteen-page table gives properties of metallic and nonmetallic minerals.

If you'd like to know more about Dow mining chemicals, contact your nearest Dow sales office or write THE DOW CHEMICAL COMPANY, Midland, Michigan, Chemicals Sales Department 765J-1

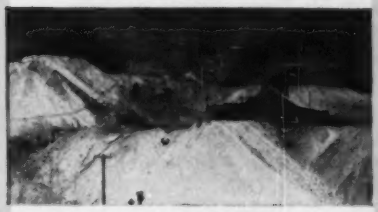
ON THE MINING CHEMICAL NEWSFRONT

SEPARAN® FLOCCULANTS—Separan NP20 has joined the well established Separan NP10 in solving difficult filtration and settling problems.



CAUSTIC SODA—Note for those using caustic to precipitate uranium from pregnant solution: new Dow terminal in Grants, N. M., now serving industry.

CALCIUM CHLORIDE—Protect coal and ore from freezing with Peladow® (94-97% calcium chloride in pellets) or Dowflake® (77-80% calcium chloride in flake form).

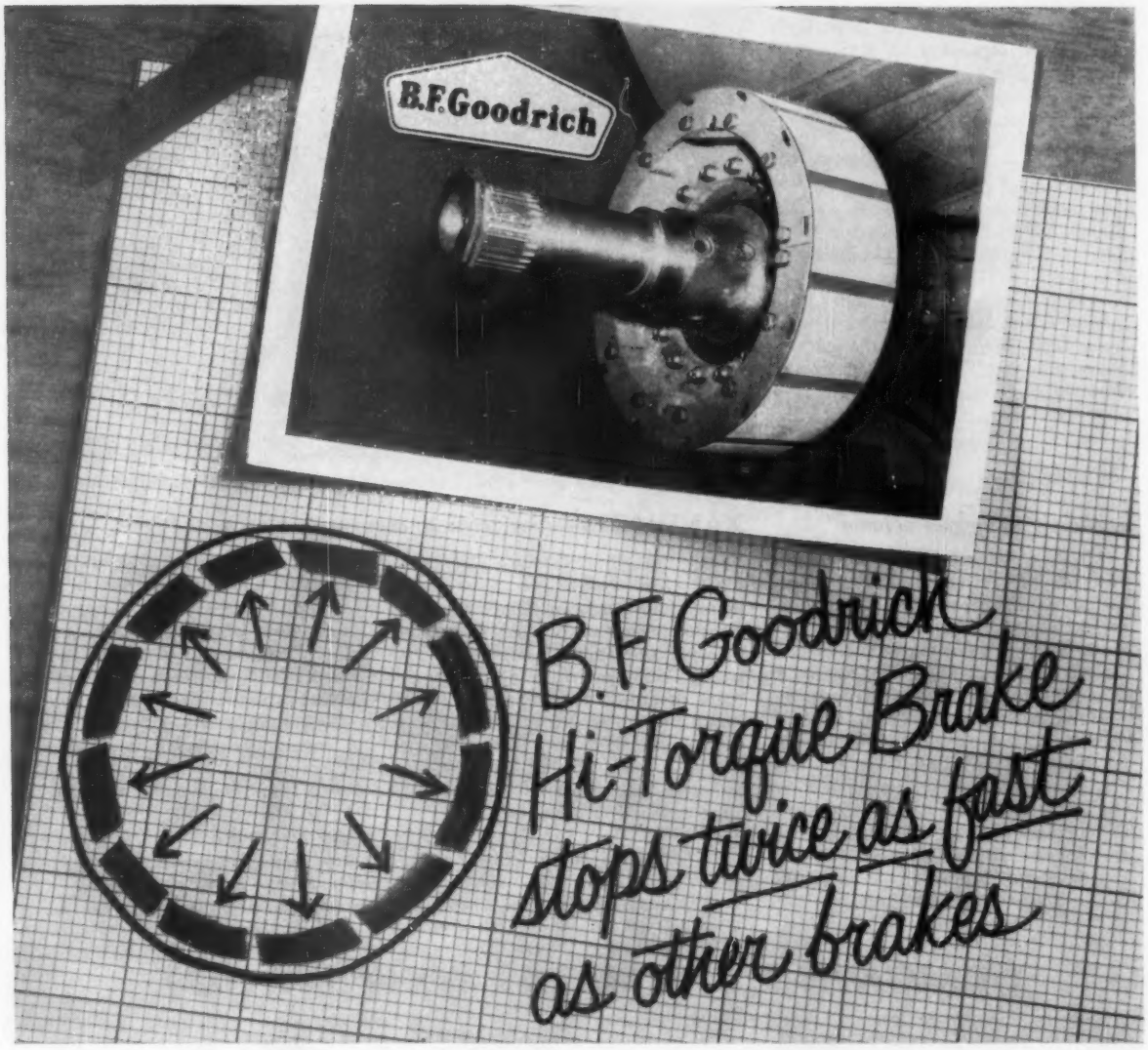


MAGNESIUM HYDROXIDE—New idea in precipitants . . . more reactive, more responsive, freer flowing, does not lump in storage. Uranium processors now using.

DOW CHEMICALS *basic to the mining industry*

Flocculants • Ion Exchange Resins • Preservatives • Chelating Agents
Ammonia • Solvent Extractants • Hydrochloric Acid • Frothers • Chlorine
Calcium Chloride • Alkalies • Flotation Agents

YOU CAN DEPEND ON DOW



There's a big difference between B.F.Goodrich Hi-Torque Brakes and conventional two-shoe brakes. It's called *full circle stopping power.*

Here's how it works. Each of the segmented shoes is forced by hydraulic actuation radially against the inside of the brake drum. This exclusive design gives more useful lining contact area, greater than any other comparable size drum brake. And because of the non-servo hydraulic actuation, each of the shoes follows drum eccentricities without "grabbing".

Just how effective are B.F.Goodrich Hi-Torque Brakes? They give you smoother, faster, safer stops with far less chance of fade. For example, a popular 24-ton capacity truck equipped with these new brakes achieved a deceleration rate of 18 Ft/sec^2. The same truck equipped with conventional two-shoe brakes stopped at a rate of only 7 Ft/sec^2. Both tests were run under the same load conditions and at the same speed.

No matter what kind of wheeled off-road vehicles you use, B.F.Goodrich Hi-Torque Brakes can help your operators cut cycle time, cost.

You'll find that simple, rugged construction and automatic adjustment reduce maintenance time, too. Find out how you can get B.F.Goodrich Hi-Torque Brakes on your new, larger equipment. Write: *B.F.Goodrich Aviation Products, a division of The B.F.Goodrich Company, Troy, Ohio.*

B.F.Goodrich *Hi-Torque brakes*

Whatever Your Mining Operations

from AGGREGATES to ZIRCONIUM

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50-year leader in mining equipment

Whether your job is to move millions of yards from deep river beds, or to separate rare metallic minerals – up-to-the-minute mining equipment designed, developed, manufactured and *proved* in worldwide application by Yuba will pay for itself over and over again. You'll find it profitable to get full information from *Yuba Mining Division, Yuba Consolidated Industries, Inc., Benicia, California.*

Yuba designs and builds a wide range of equipment for the mining industry, including.

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"MOVALL" EARTHMOVERS

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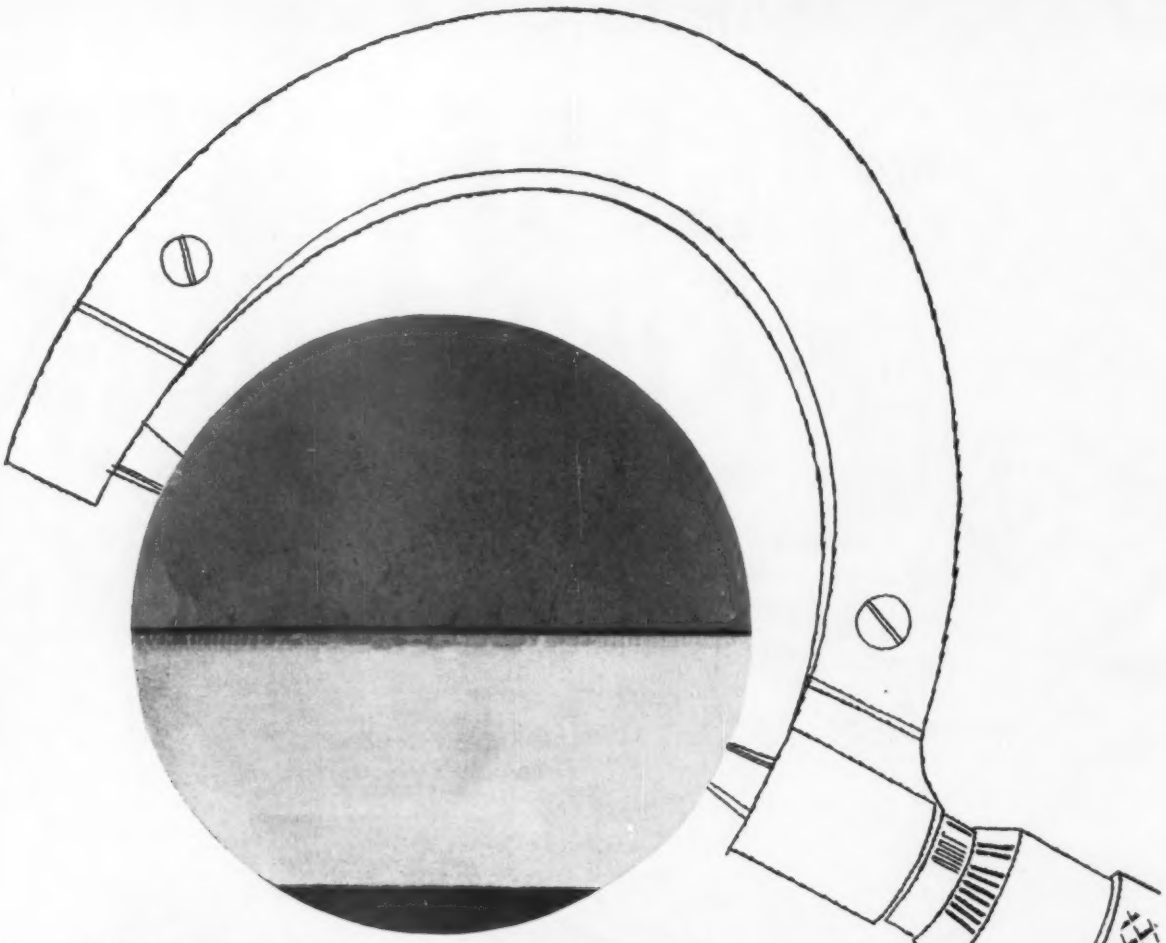

the measure of quality is

performance

Moly-Cop Grinding Balls perform superbly on toughest grinding jobs because they have the necessary hardness to stand up to the long economical grind. They wear evenly because of that hardness which is uniform right to the core. That's the result of technological control in alloying, forging and heat treating by Sheffield. And the reason why Moly-Cop Balls are THE STANDARD OF COMPARISON AROUND THE WORLD.

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TRADE MARK

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Grinding Balls

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EXPORT REPRESENTATIVES, THE ARMCO INTERNATIONAL CORPORATION, MIDDLETOWN, OHIO

CYANAMID REAGENT NEWS

"ore-dressing ideas you can use"

NOW AVAILABLE . . .
Mineral Dressing Notes No. 23

Chemistry of Cyanidation, with an added section: Arsenic and Antimony Sulphide Minerals in Cyanidation

TABLE OF CONTENTS

	PAGE NO.
CHEMISTRY OF CYANIDATION	
Introduction	3
FUNDAMENTALS OF CYANIDATION — Section 1	5
Decomposition of Cyanide Solutions	5
Dissolution of Precious Metals	6
Effect of Cyanide Concentration on Rate of Dissolution	6
Relative Rates of Dissolution of Gold, Silver and Their Alloys	7
Effect of Particle Size on Rate of Dissolution	7
Effect of Oxygen on Dissolution of Gold	8
Effect of Alkalinity on Gold Dissolution	8
Effect of Temperature on Cyanidation	9
ZINC IN CYANIDATION — Section 2	10
Zinc Cyanogen Complexes and Zincates	10
Solubility of Metallic Zinc in Cyanide Solutions	11
Solubility of Zinc Minerals in Cyanide Solutions	11
Reaction Products from Zinc Minerals and Cyanide	12
Titration of Cyanide Solutions Containing Dissolved Zinc	12
Dissolution of Precious Metals in Sodium Zinc Cyanide	14
COPPER IN CYANIDATION — Section 3	17
Copper Cyanogen Complexes	17
Solubility of Copper Minerals in Cyanide Solutions	18
Reaction Products from Copper Minerals and Cyanide	19
Titration of Cyanide Solutions Containing Dissolved Copper	20
Dissolution of Precious Metals in Copper Cyanogen Complexes	21
Effect of Copper on Dissolution of Pure Gold	22
Cyanidation of a Copper-Bearing Gold Ore	23
Cyanidation Practice at Noranda Mines, Ltd.	25
Methods of Eliminating Copper from Gold Ores	26
IRON IN CYANIDATION — Section 4	28
Iron Cyanogen Complexes	28
Decomposition of Iron and Iron Minerals in Cyanide Solutions	31
Cyanidation Practice at Morro Velho Mine	33
Decomposition of Pyrrhotite in Cyanide Solutions	34
Titration of Cyanide Solutions Carrying Pyrrhotite Decomposition Products	38
ARSENIC AND ANTIMONY SULPHIDE MINERALS IN CYANIDATION	41
Introduction	41
Summary	41
Preliminary Work— Preparation of Synthetic Gold Ore	42
Relative Rates of Decomposition of Arsenic and Antimony Sulphide Minerals in Cyanide	43
Reactions	45
Cyanidation Tests on Synthetic Gold Ore	45
Oxidation of Alkaline Sulphide, Thioarsenite, and Thioantimonite in Cyanide	48
Effects of Lead Nitrate on the Cyanidation of Synthetic Gold Ores Containing Orpiment and Stibnite at pH 10	49
Discussion	51
References	52
Appendix— Methods of Analysis	52
CYANIDATION OF GOLD-SILVER-STIBNITE ORE FROM CUBA	53

This authoritative bulletin on cyanidation of precious metal ores, first issued in 1950, has been reprinted with an added section, Arsenic and Antimony Sulphide Minerals in Cyanidation. Check the table of contents below for a listing of the factual, useful information contained in this new issue of Mineral Dressing Notes. Send for your copy with the coupon below.

For over 40 years, Cyanamid has been supplying the mining industry with AERO® Brand Cyanide and technical "know-how". Backed by the years of experience of its field engineers located in the major mining areas of the free world, and the services of its Mining Chemicals Laboratory, Cyanamid is best fitted to serve you with both a wide variety of mining chemicals and valuable in-the-mill assistance.

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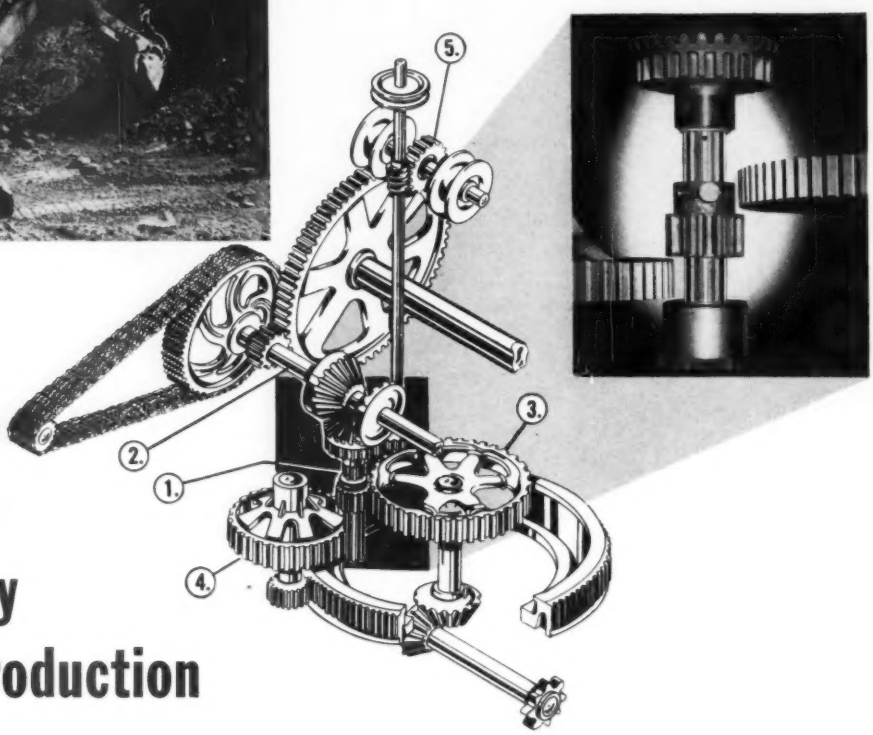
"Collins Gate"
377 Little Collins Street
Melbourne, Australia

A fast cycle and a full dipper every pass enable this 2½-yd. Model 3500 shovel to move overburden at top speed for 'round the clock operation. One of the most important factors contributing to a consistently high production rate is the Manitowoc "Power-flo" drive described below.



The key to Manitowoc's extra power is the key to top production

. . . and that extra power is provided through the *exclusive* Manitowoc "Power-flo" slide pinion arrangement that directs the full flow of engine power *only* to the function in operation. There are no power-robbing extra gears moving, even when not in operation (and gears that don't move don't wear out) . . . no complicated trains of gears that hold production down and keep maintenance costs up.

What arrangement could be simpler? As shown in the photograph above, the slide pinion itself is a single, sturdy shaft, spline-fitted with the necessary gears to engage, or disengage the desired function. The slide pinion (No. 1 on the drawing) is driven directly from the drive shaft (2) using only one set of clutches to drive the travel, swing and boom hoist.

With the slide pinion up, the power flows directly from the reversing clutches to the travel gear (3) through the center pin and to the horizontal shaft in the carbody.

With the slide pinion down, the power flows directly to the swing shaft (4) containing the final drive pinion, which meshes with the carbody ring gear.

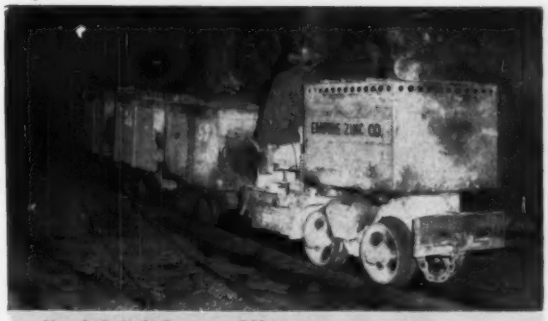
With the slide pinion in neutral, the reversing clutch is left free to operate the boom hoist (5) if an optional independent boom hoist is not used.

The result is *direct* power to every function . . . a feature found in *Manitowoc* cranes, draglines and shovels. The faster cycle, heavier lifts and bigger bites found in Manitowocs are the direct result of this simple and effective "Power-flo" design. That's why output is *measurably* higher with Manitowoc . . . that's why it will pay you to see your Manitowoc dealer for complete information on the rig best suited to your operation.

Manitowoc

MANITOWOC ENGINEERING CORP.
(A subsidiary of The Manitowoc Company, Inc.)
MANITOWOC, WISCONSIN

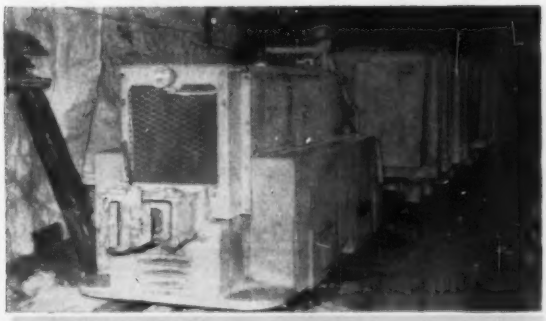
CRANES	SHOVELS	DRAGLINES	TRENCH HOES
20 TON - 100 TON	1-YD. - 5½-YD.	1-YD. - 6-YD.	1-YD. - 2½-YD.



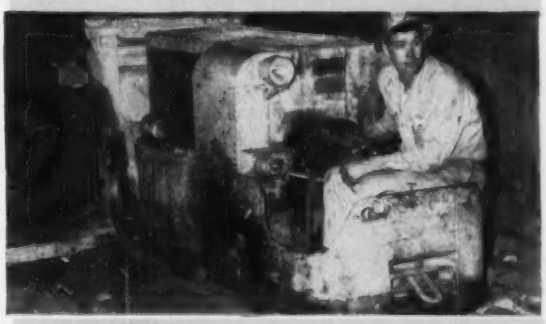
Mancha's Little Trammer, 1 ½-ton

Mancha's Standard AX, 5-ton

Storage Battery—Flexible and safe. Can be used anywhere—of particular advantage in heavily timbered areas. New designs of larger sizes meet main line haulage specifications.



Mancha's D12CA, 12-ton

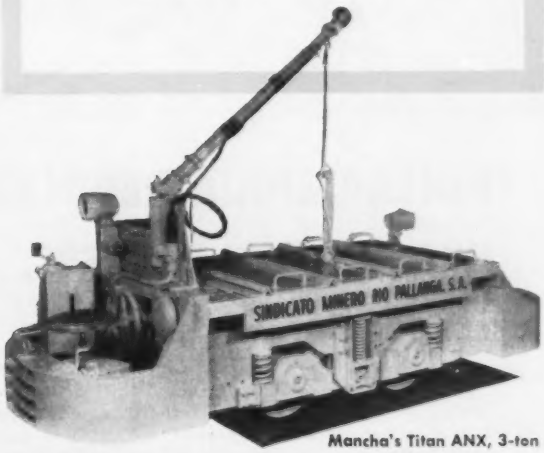


Mancha's D2HF, 2-ton

Diesel—Unlimited haulage range. Preferred for main line adit and tunnel haulage where ventilation is not a problem. No permanent power installation required.

Where haulage efficiency is highest you'll find MANCHA Locomotives

In metal and non-metallic mines . . . in tunnels, for light tramming or heavy hauls, long distances or short . . . there's a Mancha locomotive to fill the need. And for each application a "job analysis" assures a unit to meet conditions . . . to provide top efficiency.



Mancha's Titan ANX, 3-ton

Trolley—Most popular and lowest cost for continuous haulage demand where permanent installation is practical and trolley wire can be protected.

If you would like to know more about any of these Mancha locomotives or other sizes available for both mine and industrial applications, write us today.

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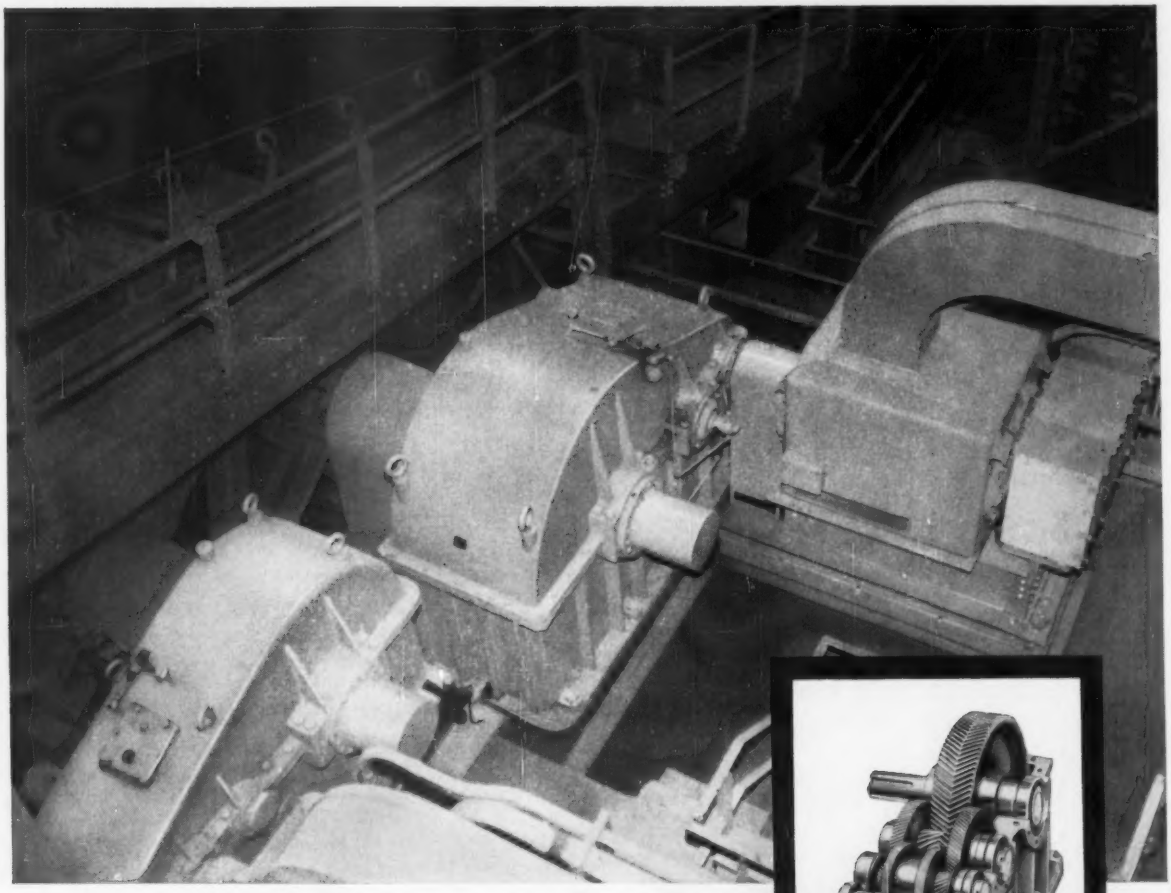
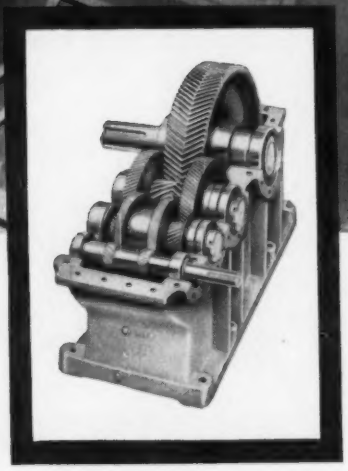
Mancha representatives are located in principal mining areas throughout the world.





PHILADELPHIA REDUCERS ARE HEAVY DUTY "PLUS"...

and the big jobs prove it!

The big jobs, like these 1,500,000 inch-lb. output torque units in a taconite processing plant, are the ones that demand the extra "plus" in reliability and performance of Philadelphia Parallel Shaft Reducers.

In reliability, Philadelphia Reducers are the "heavies" of the heavy duty drives, with extra strength built into every part. Housings are reinforced at points of greatest stress. Bearings are extra heavy to take severe and repeated shock loads . . . handle heavy overhung loads. Shaft alignment is accurate, and shafts have that extra "heft" that keeps them running true.

In performance, these reducers have no equal. Gearing is designed to the needs of each application and symmetrically arranged in the housing. Hence, bearings on each shaft carry equal loads, shaft deflections are minimized, bearings and gearing have higher shock load capacity.

In value, a Philadelphia drive assures long rugged life and freedom from dollar-eating maintenance problems. Pound for pound, horsepower for horsepower, dollar for dollar you can't buy a reducer that will outlast a Philadelphia.

Philadelphia Parallel Shaft Reducers are available in single, double and triple reductions for ratios of 1.25:1 to 292:1. Write today for your copy of catalog H-58.

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Offices in all Principal Cities • Virginia Gear & Machine Corp., Lynchburg, Va.
INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS

No. 10 in a series

Right off the Wire

A miniature record player only four by eight inches is capable of playing twelve inch records.

The record of many thousands of electrical installations shows that the use of TIREX cords and cables provides an extra measure of employee safety.

A new process removes helium from natural gas, in which it is a contaminant, by passing the gas through glass pipes, through the walls of which the helium is filtered.

An atomic-powered train has been designed that will travel across country without tracks. It has fifty-two wheels, each of which is electrically driven.

The plastic base of a new electric coffee pot completely encloses and waterproofs both heating element and thermostat.

Titanium alloyed with ranadium, chromium and aluminum makes a new alloy that is said to have the greatest strength for its weight of any structural material.

A complete picture, ready for transmission, is provided by a new transistorized television camera. It weighs only four pounds, including self-contained control and synchronizing units.

A radio telescope over four-hundred feet in diameter is planned for the hills of West Virginia.

Weather information can be transmitted over a thousand-mile range by an automatic radio station which can be dropped anywhere by an airplane.

An automatic electronic inspection machine makes a four-way check of automobile valves at the rate of 3,000 per hour with a tolerance of five millionths of an inch.

An adhesive has been developed that will retain a metal-to-metal bond at temperatures as low as −253 degrees C.

All cords and cables give better service when handled properly. TIREX® portable cords and cables, *although jacketed with fortified and tempered neoprene armor and "lead cured" for toughness and smoothness*, will give still longer service if not subjected to unreasonable abuse.

By making jet nozzles radioactive and measuring the radiation from the fuel passing through them, the amount of wear can be measured to within one millionth of a gram per hour.

Further information on these news items and on Simplex cable is available from any Simplex office. Please be specific in your requests.

A miniature battery which is reported to last for five years, uses the radioisotope Prometheum 147. It is suitable for hearing aids, watches or missile guidance systems.

In California, it is proposed to use underground steam to generate electricity as is being done in Italy and New Zealand. Wells are now being drilled and a yield of 100,000 kilowatts is anticipated.

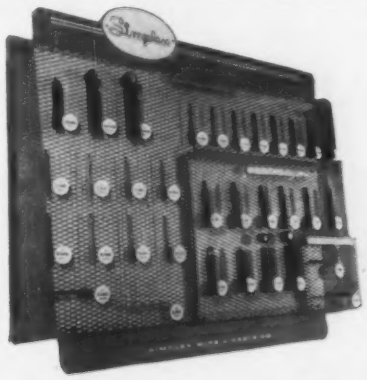
Two radio manufacturers have built extra service into their sets. One warns of approaching tornadoes and the other acts as a radiation detector.

Deuterium, or heavy hydrogen, is concentrated by some bacteria from sea water. This discovery may lead to a new and inexpensive method of producing the heavy water used in reactors.

The area behind the eye that can not be examined by other instruments can now be seen by a device that uses penetrating sound waves and converts their reflection into light.

A disposable medicine container of heat-proof plastic doubles as a hypodermic syringe.

Our atmosphere at an altitude of sixty miles is now known to contain chemicals which could serve as an unlimited fuel supply for ramjet engines.



What's in a name?

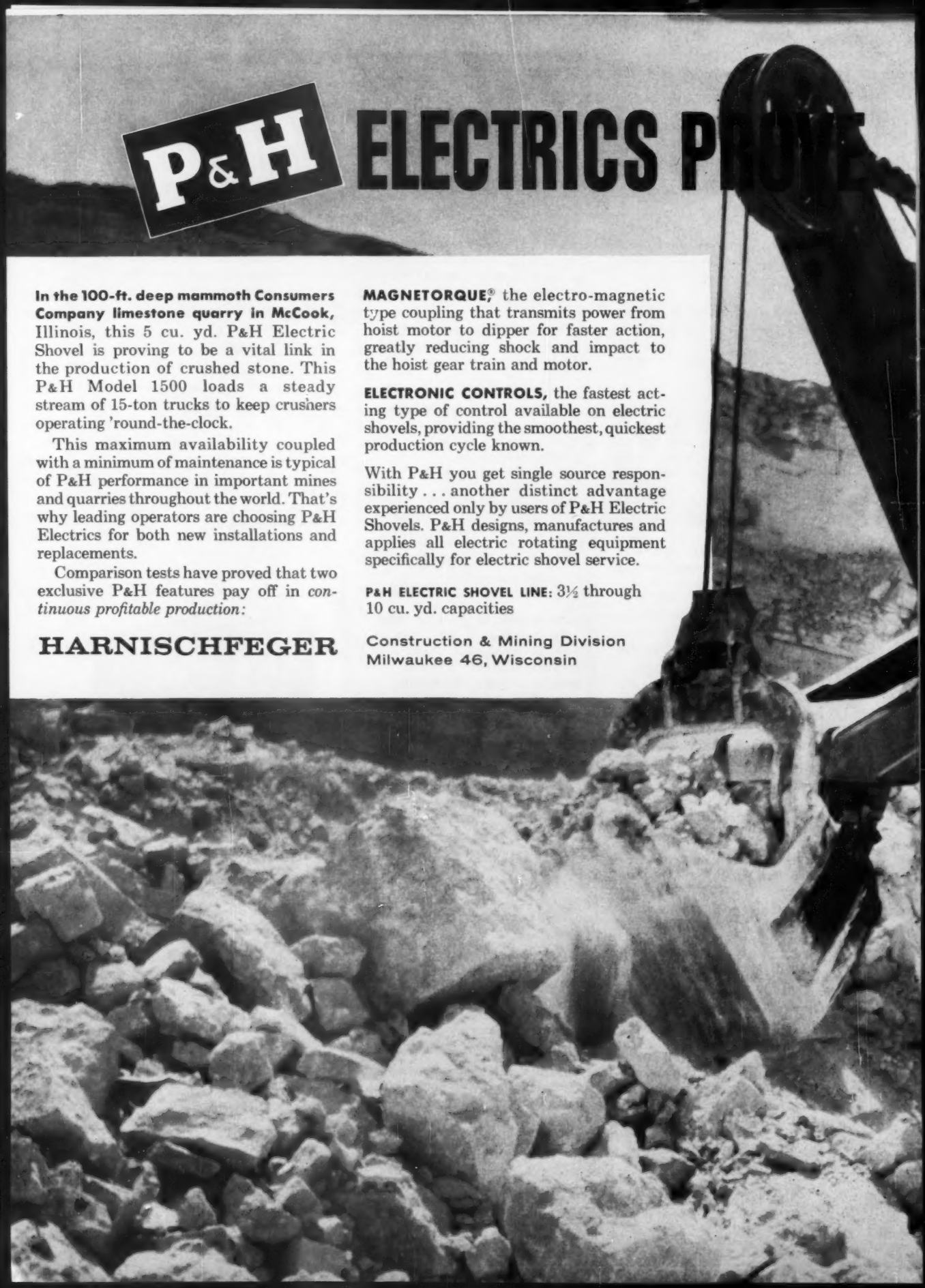
The character and business integrity of distributors are measured to a great extent by the products they handle. More than 1000 of the nation's most successful electrical firms — offering the utmost in customer service and satisfaction — recommend and sell Simplex TIREX cords and cables.

SIMPLEX WIRE & CABLE CO.
Cambridge, Massachusetts and
Newington, New Hampshire

Simplex

Highest quality cables for: Mining
Power & Lighting • Construction
Transportation • Communications
Signalling

"The American manufacturers of transoceanic telephone cables"



In the 100-ft. deep mammoth Consumers Company limestone quarry in McCook, Illinois, this 5 cu. yd. P&H Electric Shovel is proving to be a vital link in the production of crushed stone. This P&H Model 1500 loads a steady stream of 15-ton trucks to keep crushers operating 'round-the-clock.

This maximum availability coupled with a minimum of maintenance is typical of P&H performance in important mines and quarries throughout the world. That's why leading operators are choosing P&H Electrics for both new installations and replacements.

Comparison tests have proved that two exclusive P&H features pay off in *continuous profitable production:*

MAGNETORQUE,® the electro-magnetic type coupling that transmits power from hoist motor to dipper for faster action, greatly reducing shock and impact to the hoist gear train and motor.

ELECTRONIC CONTROLS, the fastest acting type of control available on electric shovels, providing the smoothest, quickest production cycle known.

With P&H you get single source responsibility . . . another distinct advantage experienced only by users of P&H Electric Shovels. P&H designs, manufactures and applies all electric rotating equipment specifically for electric shovel service.

P&H ELECTRIC SHOVEL LINE: 3½ through 10 cu. yd. capacities

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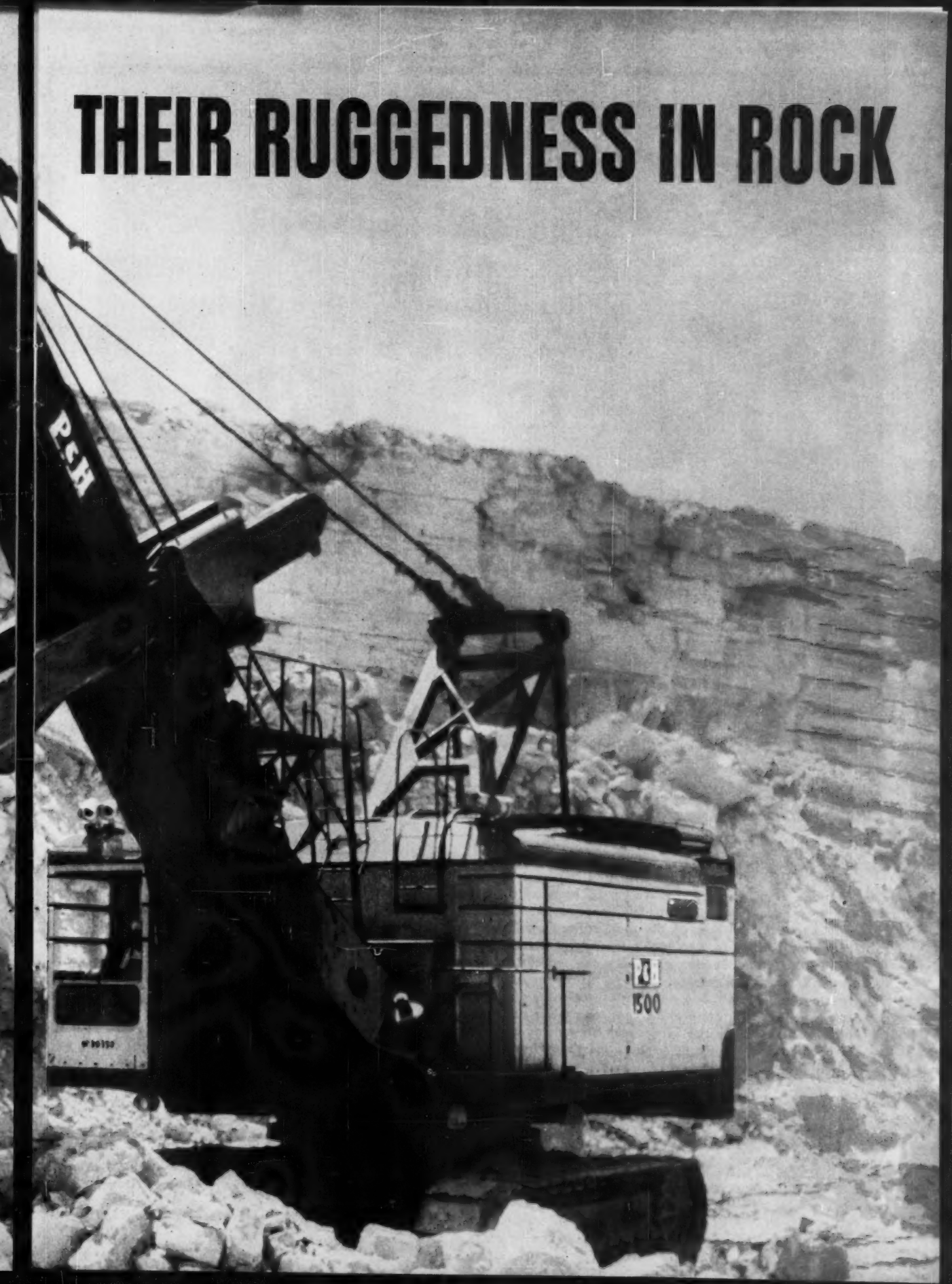
Construction & Mining Division
Milwaukee 46, Wisconsin

THEIR RUGGEDNESS IN ROCK



FIRESTONE ON-THE-JOB TIRE SERVICE ANSWERS YOUR TROUBLE CALLS ROUND THE CLOCK!

Firestone Giant Tire Service eliminates hours of costly downtime!

Firestone service trucks are on the job 24 hours a day to beat your downtime due to tires. Completely equipped trucks are ready to service construction tires on the spot. Trained servicemen have the know-how and the tools to handle the largest tubeless or tubed off-the-highway tires. Besides emergency tire service, a Firestone Tire Expert inspects tires regularly—checks for proper inflation. Count on Firestone to turn downtime delays into worktime profits! Contact your Firestone Dealer or Store about Firestone's Giant Tire Service. Combine Firestone's Giant Tire Service with Firestone off-the-highway tires to hold down tire costs. Remember—there's a Firestone tubeless or tubed tire for every piece of equipment on construction projects.

ROCK GRIP WIDE BASE® ROCK GRIP®
TUBELESS OR TUBED

When ordering new equipment always specify Firestone tires.

Enjoy the Voice of Firestone on ABC television every Monday evening.

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BETTER RUBBER FROM START TO FINISH

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CYANAMID EXPLOSIVES REDUCE COST PER TON OF ORE!

In blasting, you need maximum efficiency to minimize cost per ton of ore. Explosives users who rely on the Cyanamid Line find higher energy that results in better fragmentation . . . high water resistance . . . and many other "plus" advantages.

Whether ore is a rich vein or is disseminated throughout the rock, scientific blasting with Cyanamid Explosives will break it loose in the form which you can most economically handle.

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INCREASE CORE RECOVERY

IN "HARD TO CORE" FORMATIONS

Christensen adapts equipment to deliver highest percentage core recovery

Until recently the mining industry has had to put up with very poor core recovery in soft, sticky or unconsolidated formations, making accurate analysis of ore reserves extremely difficult. To increase core recovery Christensen, working closely with the operator, adapted equipment to the job. This newly adapted soft formation equipment cores ahead of the circulating fluid, protecting the core from fluid erosion. Today the geologist is receiving complete soft formation cores which enable him to fully analyze the ground below the rig for productive ore bodies. This is the result of a Christensen field consultant working in the field with the operator to adapt equipment to the job. **Whether it is soft formation or hard abrasive fractured rock, Christensen know-how is always available to help you increase core recovery and operate at "less cost per foot," regardless of operating conditions.** Call or write the Christensen field consultant nearest you today.

Every dollar invested in exploration is spent for the sole purpose of evaluating ore reserves. To properly analyze the ground below the rig, the geologist must have "good" cores. Christensen's 4½" x 3", B-3018 barrel delivers best possible cores in soft formations. For more detailed information write Christensen Diamond Products. Specify No. SF-967.

Diamonds Mean, "Less cost per foot."

CHRISTENSEN DIAMOND PRODUCTS

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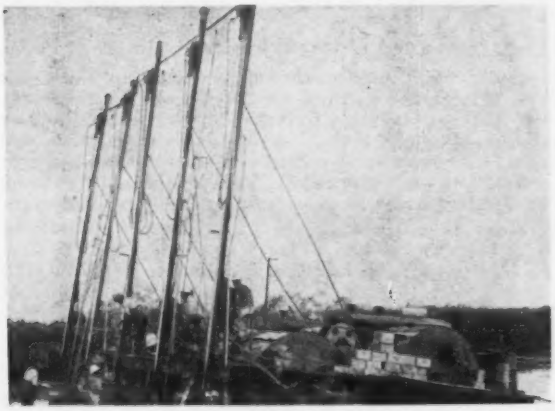
E&MJ NEW PRODUCT DIGEST

Performance Case Histories on Recently Developed Equipment

Looking for a better method, a better machine to cut costs, improve performance—to modernize your mine, mill, smelter or refinery? Here are eight pages of cost cutting case histories to illustrate what modern equipment can do for you. By no means is this list complete. The items shown here are chosen only to illustrate the possibilities. Check the many product classifications in *E&MJ's* Mid-June 1958 Mining Guidebook buyers' guide section for other equipment manufacturers who may have similar performance data to show. Check the advertisements that appear each month in *E&MJ* for new developments and case histories. And make a regular habit of checking through the new products and new literature notices that appear in this section each month.



Cost Cutter No. 1—Production Drilling

What would you do to solve this problem—swamp, muck and several feet of water overlying limestone intermixed with loose shell, marl and sandstone, the rock rapidly changing in characteristic, and hole cleaning aggravated by loose muck falling into the hole. Clemens Construction Co. solved the problem with the rig shown above—a drill buggy constructed in Clemens' shop at West Palm Beach, Fla. Seven hollow steel wheels, 5 ft wide and 7 ft in dia, support a platform on which are mounted five Ingersoll-Rand X-71WD (modified) rock drills and two I-R Gyro-Flo 600 cfm rotary compressors. Two I-R air motors geared to two wheels maneuver the buggy over the swamp. An average of 200 16-ft minimum holes (20-ft maximum) are put down in a 10-hour day on 9-ft centers (five holes wide). Drill steel is 24-ft lengths with lug shank; bits are 3¼ in.

Cost Cutter No. 2—Goliath Bowl Scrapers

Late in August 1958, the highly imaginative R. G. LeTourneau, Inc. came back into the earthmoving field with a bang—two huge bowl scrapers—a 70-ton and a 125-ton machine. Each wheel on the Goliath is driven by an electric motor geared directly to the inner rim. Power is supplied by 600-hp diesel-electrics.

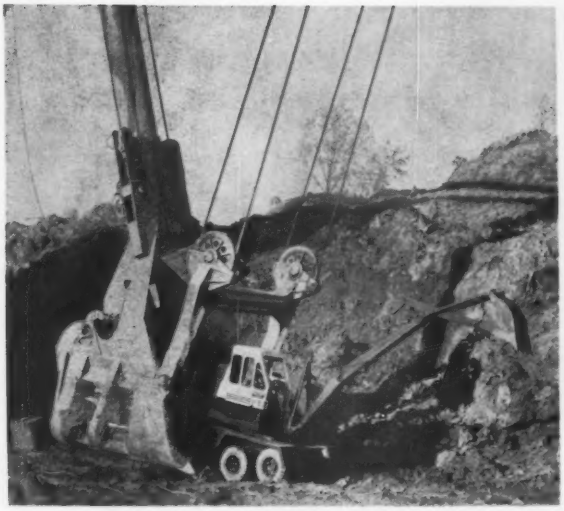
Cost Cutter No. 3—Moving the Earth

John W. Rich, vice president, Gilberton Coal Co., Gilberton, Pa., says that his company has increased production loading by 65% each shift since they replaced a 3-cubic yd shovel with a larger, 8-cubic yd Wagner WL-20 loader. WL-20 can load a 30-cubic yd Euclid in four passes in an average of 3½ minutes time, and has stepped up loading at Gilberton to 450 to 500 cubic yd per hour. Big trucks, little trucks, large and small loaders are available in the industry to suit any demand.

Cost Cutter No. 4—Stripping For Action

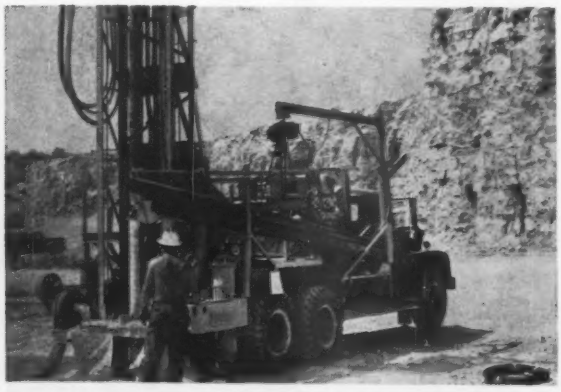
B. B. Bonner Jr., Flagstaff, Ariz., points out the bowl scrapers and tractors he used to develop an open pit for Mayhew Drilling Co. Units are Allis-Chalmers TS-360 bowl scrapers and HD tractors. Bonner had to strip the Cameron, Ariz. pit for Mayhew to measure 500x200 by 117 ft deep, removing some 250,000 cubic yd of shale, clay, sandstone and ore. Three TS-360, one HD-16, two HD-21 and one HD-6G machines are used. From the point where the TS-360 begins loading in the pit to the dump-out, the distance is 1,300 yards, existing up a steep ramp that requires low gear all the way out. Yet the loading, climbing, dumping and return are completed in 3½ minutes with a 17-cubic yd payload on each trip out. Bonner says, "We can finish the job as much as 30% faster and at correspondingly lower labor costs with more trips per shift and more excavation each day."

For more information on these cost-cutting case histories, circle the number on the card, address and mail to *E&MJ*.



Cost Cutter No. 5—Shovels, Big and Small

We just had to run this photograph. It's not a toy; not a model. It's a 3/8-yd Bucyrus-Erie 11-B Transit Hoe climbing into the bucket of the 55-yd Bucyrus-Erie stripping shovel, the River Queen—a dramatic illustration of the variety and versatility available in modern shovels. The River Queen is by no means the largest, yet weighs 2600 tons compared to the 11-B's 11 tons. Other famous monsters of the midway are—the 60-yd Mountaineer (Marion), the 70-yd King of Spades (Marion) and International Minerals & Chemical Corp's famous dragline—the 30-yd Bigger Digger (Bucyrus-Erie).

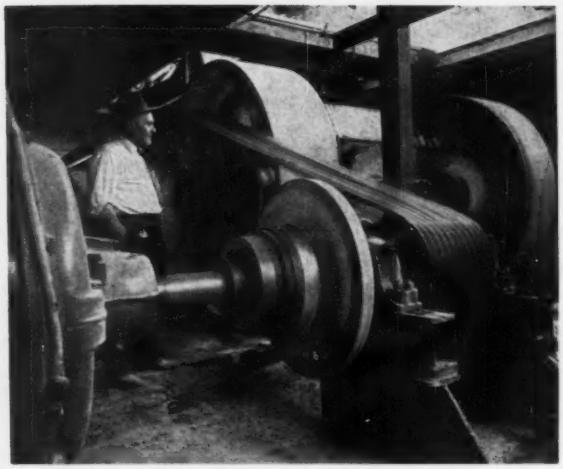


Cost Cutter No. 6—The Challenge of Taconite

Reich Brothers Mfg. Co. Inc. put a truck-mounted combination rotary and down-the-hole rig into competition with other similar rigs in various locations and reports the following results:

Hard limestone—59 ft per hour against 40 ft per hour for a crawler-mounted competitive rotary.

Minnesota Iron Range—Reich truck-mounted machine drilled 1,834 ft against 1,131 for competitor in a seven-day trial. Against another machine's 55-ft of 9-in. hole, Reich's rotary drilled 280 ft of 6½ in. hole per shift in taconite. Drilling angle holes in soft-to-medium iron ore, the Reich rig averaged 174 ft per hour with a down-the-hole hammer (twice as much as a competitor with a down-the-hole hammer). Using a Gardner-Denver hammer, the Reich unit drilled 35 ft per hour in taconite (competitor managed 20 ft per hour). In tough taconite, the Reich combination rotary and down-the-holer averaged 20 ft per hour. Shortly after the tests, a crawler-mounted combination was purchased by one large iron mining company.

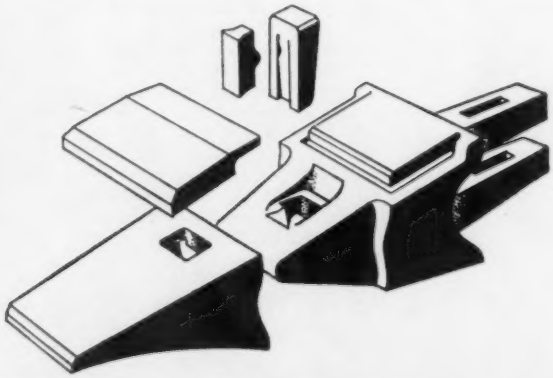


Cost Cutter No. 7—Flexidyne Couplings

Underground mine conveyor was installed by Ozark Ore Co., Iron Mountain, Mo., with 340-ft length to handle 190 tph iron ore. Unit has a Dodge Mfg. Co. 11C Flexidyne coupling to protect against overload and to help start loaded belts. Belt motor is only 20hp at 1160 rpm. Ozark is well pleased with the results and has installed three 15C Flexidynes on 40-hp motors and two 8C couplings on smaller drives.

Kaiser Aluminum, at Gramercy, La., uses a 22CK Flexidyne on a 54-in. surface belt, 1400 ft long, running at 1200 motor rpm. Flexidyne limits belt tension on start up, permits across-the-line starts of normal torque motors resulting in substantial savings in first costs and maintenance, says Dodge. Cushioned start is easy on all parts of the drive and the coupling functions so that the belt is not lifted off the idlers at vertical curves.

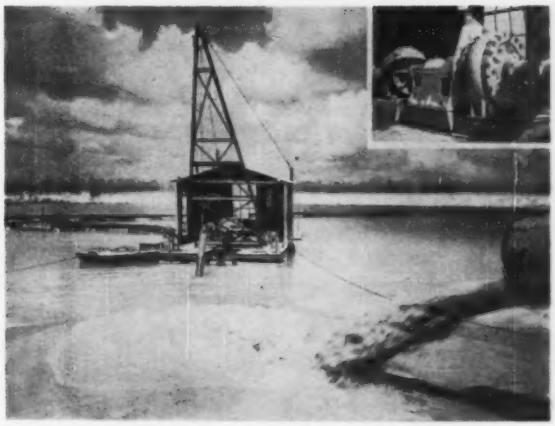
A 27C Flexidyne is used to connect a jaw crusher and its 150-hp motor at Arborio & Sons Co. trap rock plant, Farmington, Conn. Unit starts twice a day, requires only 20 to 25 seconds to accelerate to full speed. Company says that the crusher now operates at higher speeds.



Cost Cutter No. 8—Be Your Own Shovel Dentist

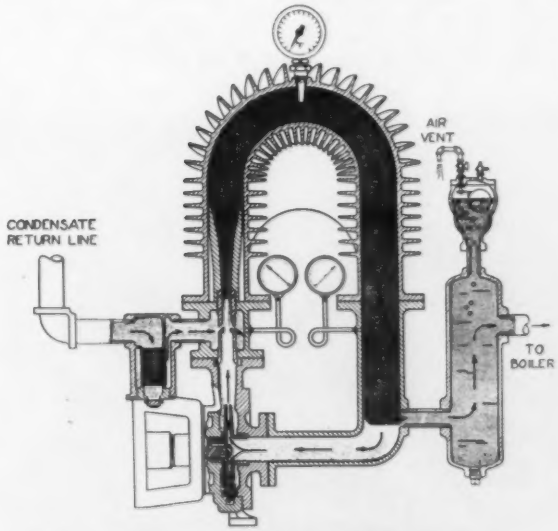
Reversing-tip design on the American Manganese Steel Div., American Brake Shoe Co.'s Simplex dipper tooth means longer wear for the shovel operator—simply reversing the tip of the two-part tooth increases wear life. Even when the tooth is worn, it's easy to knock out the retaining pin and substitute a fresh, shiny denture. In a recent trial, two Amsco Simplex teeth outlasted two competitors' teeth by a two-to-one margin. Amsco teeth survived 12,445 and 13,920 tons moved in a North Carolina limestone quarry without being reversed. Quarry operator commended on their ease of change.

For more information on these cost-cutting case histories, circle the number on the card, address and mail to *E&MJ*.



Cost Cutter No. 9—Tough Dredge Pumps

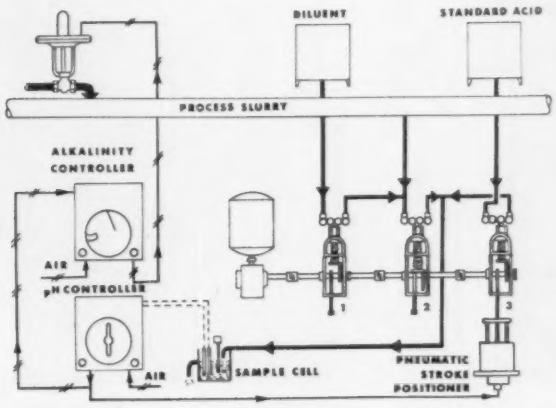
Preventive maintenance is the key to long dredge pump life at Oak Ridge Sand Co., Mulberry, Fla. Using a Morris 8G-26 pump on the dredge, a total of 125,365 cubic yd per impeller and 260,000 yd per casing is average. Another pump—a Morris 6GQF—is located near the sand plant and shows 103,029 yd for impeller and 361,249 yd for casing. Operation has been going on for six years. At periodic intervals, the pumps are pulled, low or worn spots welded, packing replaced and shaft sleeves checked. Pumps are inspected every two to four weeks. Morris dredge pump is an 8-in. unit with a 23½-in. impeller, and pumps at 250 yd per hour through a 1400-ft tail line at a static head of 17 ft. Pump is driven by a 250-hp, 865-rpm electric motor.



Cost Cutter No. 10—Condensate Saves Steam

Efficiency of steam-heated equipment can be increased in two ways through the use of closed-loop, high-pressure condensate return systems by (1) returning condensate directly to the boiler or to the feedwater system with minimum heat loss; and (2) permitting rapid transfer of latent heat from steam to product. These systems eliminate all of the thermal losses of open-type drainage systems.

Cochrane Corp.'s high-pressure jet action drainage and condensate return system is illustrated above. C-B System uses a combination jet and centrifugal pump to maintain continuous flow at optimum vent conditions without excessive steam pressure or temperature head losses. The C-B System was installed on a dryer which called for steam at 10,000 lb per hour, 20 gpm condensate and a differential pressure between pump input and output of 70 psi. The pump takes suction directly from the dryer outlet line and injects it into the boiler without first reducing it to atmospheric pressure. This eliminates flash, water and temperature losses (except line radiation), reducing steam costs by 10%—a gain of about 1,000 lb per hour steam.



Cost Cutter No. 11—Continuous Process Control

In processes where control cannot be maintained by controlling pH, conductivity or specific gravity, Milton Roy Co. suggests titration to a measurable end point. Using the Dow-Hart titrator in the flowsheet above, continuous accurate titration is obtained, the results being used to control the process variables. Milton Roy Titronic system uses a duplex controlled volume pump with one liquid end metering the sample, while the other liquid end meters an exactly proportional volume of standard sample. Both samples discharge into the titrating units, where end point or redox electrodes determine the end point of the reaction. Flowsheet is reprinted from Milton Roy literature and is a Dow Chemical Co., Freeport, Texas process wherein alkalinity is critical.

Cost Cutter No. 12—Big Dragline Buckets

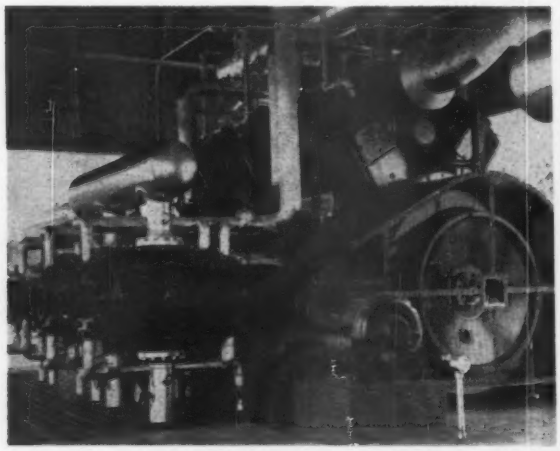
With trucks, trailers and earthmovers getting bigger by the day, the manufacturers have had to go to bigger digging equipment—for instance, Electric Steel Foundry Co.'s 35½-cubic-yd dragline bucket. Loaded, the tri-tapered bucket weighs about 175,500 lb. Esco Alloy 12M and manganese steel castings along with U. S. Steel T-1 plate are used in the construction. Bucket was designed for an Ohio coal stripper for use on a Marion Super 7800.

While buckets are getting larger, some of the Florida dragline operators are testing lightweight units—using lightweight 20- to 30-yd buckets on machines designed for standard weight 16- to 20-yd units.

For more information on these cost-cutting case histories, circle the number on the card, address and mail to E&MJ.

Cost Cutter No. 13—Protect Valuable Stockpiles

Costly loss of fine concentrate and stockpiled ore can be prevented with Aerospray 52 Binder, according to American Cyanamid Co. The new mineral binder is a water emulsion of a synthetic resin which forms a protective coating on exposed particles while they lay in open storage or in transit in open railroad cars and trucks. It won't interfere with most metal and mineral processes later on. Aerospray 52 is economical, can be applied with a small water or gear pump, or with portable insecticide or fire-fighting pumps. One metal producer in Canada has switched from covering open gondolas with polyethylene film to Aerospray 52 to prevent loss of valuable concentrate going to the smelter.

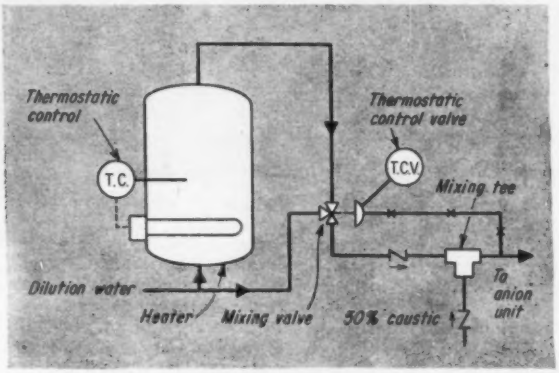


Cost Cutter No. 14—Dowtherm 209 Coolant

Ebullient cooling is cooling by means of boiling a heat transfer medium. Advantages of the method are more uniform heating of the cylinder wall, faster engine warm up, automatic circulation and temperature control of the coolant, no water pump needed, reduced corrosion and lubricant contamination and the possibility of using cheaper fuels. Water would work as the medium, except that it might freeze in winter. Ethylene glycol (permanent type antifreeze) might work, except that it won't form an azeotrope with water. Methanol has been tried, but has inherent high vapor losses and results in poor heat transfer efficiency, according to Dow Chemical Co. Dowtherm 209 forms an azeotrope with water (it will boil with water at 209 deg F when mixed 53-47 with water), will resist freezing in the minus 18 to 80 deg F range, and has good specific heat and density. Typical stationary engine with ebullient cooling system is shown above.

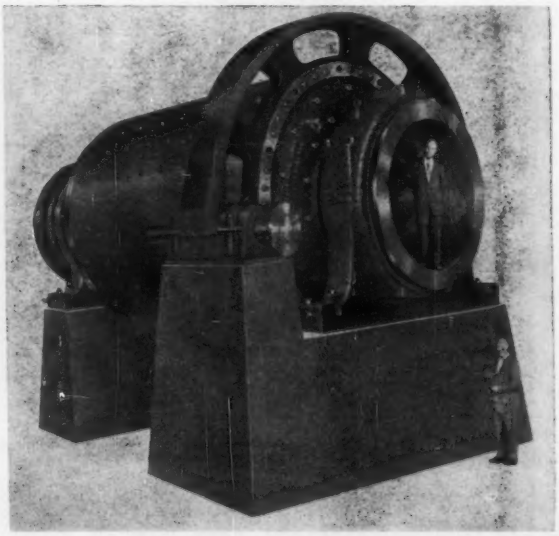
Cost Cutter No. 15—Large Retorts Recover Zinc

Zinc dross and die cast metal are being effectively reclaimed at General Smelting Co., Philadelphia, Pa., producers of spelter and dust, by a distillation process in which large single graphite retorts are used. Giant refractories for General's stationary furnaces were designed by Joseph Dixon Crucible Co. and measure 6 ft high by 2.5 to 3 ft dia and weigh 750 lb. In operation, the crucible is set on a tilt in the furnace, charged with zinc dross or die cast metal and fired to distill the zinc at 2100 to 2300 deg F. Retorts last from 30 to 90 days of service, depending on the operation.



Cost Cutter No. 16—Regenerating Ion Exchangers

"Ten ways to regenerate ion exchangers" is the title of a paper reprinted from *Power* by Graver Water Conditioning Co. Paper was written by J. S. Samkoff of Graver to show the ways to handle ion exchangers on water purification problems, but will be of interest to those with other ion exchange applications. Flowsheet above is one of the ten—using electricity to provide the heat for regeneration of the resin.



Cost Cutter No. 17—One Big for Four Small

Mine & Smelter Supply Co. recently shipped two 12½x16 ft Marcy Open End rod mills to Duval Sulphur & Potash Co.'s Tucson copper concentrator. Each mill is capable of handling 6,000 tpd, grinding from ¾ in. to about 10 mesh. Large mill eliminates the need for three or four smaller rod mills, reducing both initial and operating cost, and increasing grinding efficiency. Each mill is powered by a 1250-hp motor and is charged with 307,000 lb of rods.

For more information on these cost-cutting case histories, circle the number on the card, address and mail to E&MJ.

Cost Cutter No. 18—Diaphragm Valves

From Grinnell-Saunders Co. come three case histories on the use of the diaphragm valve in drilling, processing and smelting, examples of choosing the right valve for the right job—

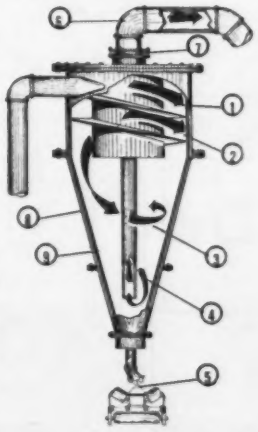
Diamond drilling. Dirty water at temperatures from 32 deg F and up in Canadian mine meant that globe and plug cock valves on the drill had to be replaced every few weeks or months due to abrasion. Diaphragm valves were installed, being cheaper, but they outlasted the useful life of the replaced units and can be repaired easily. They have been in use for two years of satisfactory service.

Bauxite processing. Caustic and abrasive liquor at 150 deg F and 50 psi destroyed gate valves about every two months, although valves were used only once a day. In one plant, more than 900 diaphragm valves have been installed and show excellent service after 18 months. User reports positive shut-off, no leakage, no maintenance.

Smelting. Salt and fresh water are used for emergency cooling of furnaces and molds. In case of pump or power failure, the diaphragm valve opens, circulates water to prevent burnout of the equipment. Valves have been in five years, still trouble-free and are approved by local fire underwriters board.

Cost Cutter No. 19—Separating Fine Sand

Retention of fines in the minus 50 to plus 200 mesh range posed a disturbing problem for Becker County Sand & Gravel Co., Cheraw, S.C., primarily due to the large amount of water used in cleaning minus 200 mesh from the sand and gravel. Fourteen 25-in. dia Whirlcone wet cyclones designed by the Cottrell Engineering Div., Georgia Iron Works were installed and solved the problem. Whirlcones recover up to 100 tph of fine, clean sand while still discarding minus 200 mesh slimes. Increase in recovery paid for the units within a few months. Whirlcones are available in diameters from 6 to 50 in.



Cost Cutter No. 20—Ripper Savings

Following up *E&MJ*'s coverage of mining with tractor and a ripper in October 1958, Caterpillar Tractor Co. offers this additional case history on how a ripper saved a stripper about $27,000 a year.

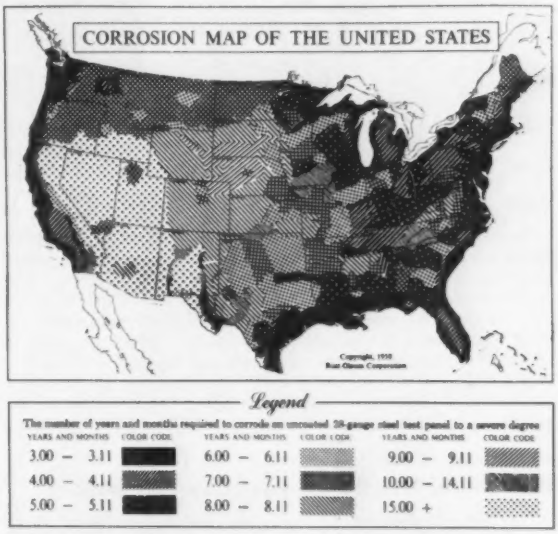
Ripping Kentucky No. 11 coal, 6 ft 4 in. thick at Ruby-Chandler-Jordan, Madisonville, Ky. with a D9 tractor and a Kelly Ripper with 96-in. shank.

Production—Ripping area 200x90 ft; ripping time 69.6 minutes; 4,200 tons ripped.

Cost—estimated by mine owner at $3,000 a year for owning tractor and operating costs for time spent ripping, as against estimated $30,000 for cost of blasting caps, powder, drill and operating labor. In addition, the tractor is available for other work since it takes only two hours to do the ripping.

Cost Cutter No. 21—X-Ray Eyes

The Quantrol, described as a practical tool in automatic process control by Applied Research Laboratories, Inc., is a single element determinator that operates directly on a moving process stream. Product may be a solid, liquid or gas, and the Quantrol can determine quantitatively any element from atomic number 19 to 100 over a wide range of concentrations. Quantrol consists of a spectrometer with X-ray source and detection system, power supply and ratio recording console which compares the unknown against a standard sample and provides permanent, direct-reading strip chart records. Quantrol irradiates process stream with high intensity X rays causing the unknown to fluoresce and the fluorescence is measured by selected element wave lengths by two geiger counters. Precision is better than 0.1%; correlation to wet assay is in the 1% range.


CORROSION MAP OF THE UNITED STATES
Legend
The number of years and months required to corrode an uncoated 28-gauge steel test panel to a severe degree
YEARS AND MONTHS COLOR CODE
3.00 – 3.11
4.00 – 4.11
5.00 – 5.11
6.00 – 6.11
7.00 – 7.11
8.00 – 8.11
9.00 – 9.11
10.00 – 14.11
15.00 +

Cost Cutter No. 22—Corrosion Rates

It took Rust Oleum Corp. 25 years to collect and analyze the data behind the above map—a map showing the rates at which rust proceeds in different areas of the U.S. Thousands of dated and uncoated 28-gage steel test panels were planted in every city with a population of over 10,000.

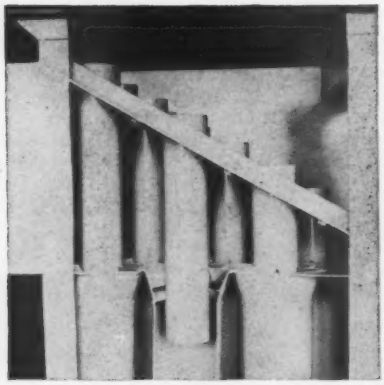
Variations in rate of rusting are the result of different amounts of rainfall, wind, corrosive gases, sunlight and salt water. Rust Oleum, manufacturers of rust-preventing coatings, estimate the annual rust bill in the U.S. at $7.5-billion, up $2-billion in the last 10 years.

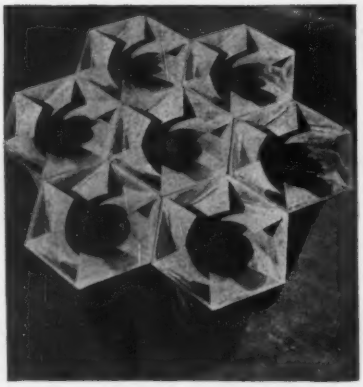
Cost Cutter No. 23—Ready-To-Use Powder

Hercules Powder Co. has recently introduced a new, low-cost, ready-to-use blasting agent called Dynatex. It is a nitro carbo nitrate powder and has the following case history under field tests—

	Prills & fuel oil	Dynatex B	Savings with Dynatex B
Average spacing (ft)	20	26	30%
Average burden (ft)	22	25	13%
Cubic yd per ft of 9½-in. bore hole	16.1	23.9	48%
Loading factor lb of explosives per cubic yd	0.51	0.45	12%
Loading time per hole (minutes)	4.8	3.4	29%
Drilling and blasting costs per cubic yd (cents)	(Drilling 6.20 Powder 2.81) 9.01	(Drilling 4.18 Powder 3.63) 7.81	13%
Labor costs per cubic yd (cents)	0.11	0.04	64%
Equipment and operator costs per cubic yd (cents)	0.10	0.07	30%
Total cost per cubic yd (cents)	9.22	7.92	14%

For more information on these cost-cutting case histories, circle the number on the card, address and mail to *E&MJ*.





Cost Cutter No. 24—Mechanical Dust Collector Is Efficient and Self-Cleaning

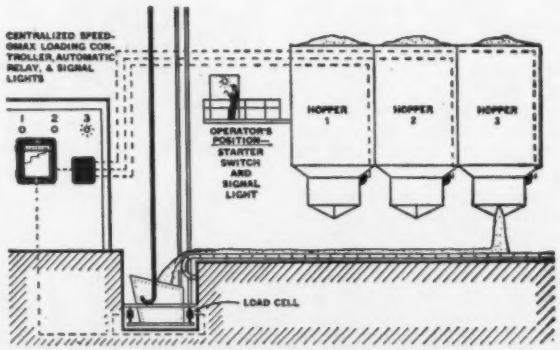
Installed at Vanadium Corp. of America's Durango uranium concentrator more than a year ago as more a curiosity than anything else, a small 25-tube Hagan Aerostatic dust collector shows no sign of wear or tube plugging to date. At left above is the inside of this multiple-cyclone-type collector. Photo in center is collector with effluent pipes removed to show how the mechanical collector is designed to make it self-cleaning. John Maxwell, mill superintendent at Durango, (right) says that "it is the first mechanical collector I have ever come across that is actually self-cleaning." Maxwell says that the collector is doing the job. Designed by Hagan Chemical & Controls, Inc., the Aerostatic collector is inexpensive in comparison to high efficiency cyclones and one that will pay for itself within a week, according to Hagan. Unit at Durango is designed for 97.7% collector efficiency based on 8,000 cfm and 6 in. wg pressure drop at 6,500-ft elevation, based on particle size distribution having 10% minus 10 microns and 30% minus 50. Collector and ductwork are installed before and after the rod mills and at the vibrator. Two 10-in. fans provide draft.

Cost Cutter No. 25—Oxygen Converts Matte

E. F. Kurzinski, Air Products Co., recently observed in an article in the *Journal of Metals* (August 1958) that one possible application of oxygen is in the conversion of matte to copper. Large scale tests made in a copper smelter produced blister from matte, and showed that blowing time can be reduced by at least 30% with 100 cubic ft of oxygen per ton blister. In addition, the burner was eliminated—a saving in fuel costs. No apparent damage was done to the lining or the tuyeres. He notes that top blowing would be even more important in production of copper. Top blowing the converter with oxygen would increase production rates due to better thermal efficiency, and would maintain higher sulphur dioxide concentration in the stack gas. Oxygen-enrichment of feed air is producing big savings in steel production, and according to the author should mean even greater benefits to copper.

Cost Cutter No. 26—Better Filtering

Reduced material and labor costs through the use of Dynel fabric has been reported by the Blind River and Bancroft uranium producers. According to mill officials and Union Carbide Corp., continuous on-the-job use of Dynel provides from two to four times more performance life than other types of fabric. In many cases, Dynel has given three months service as compared to but three weeks for other types of cloth. Dynel is resistant to acid solutions and has good wet strength.



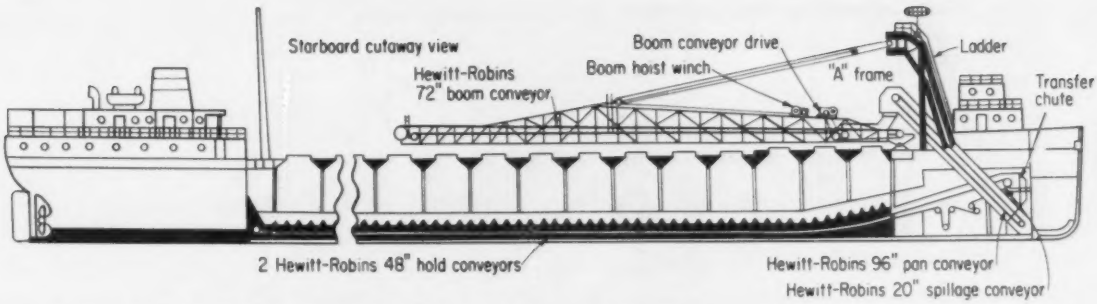
Cost Cutter No. 27—Accurate Load Cells

Electric type load cells, properly used with electronic instruments, have many advantages under such difficult factors as impact and vibration, adverse ambient temperature, high speed, awkward structure and portable equipment. Load cells operate on the principle that the resistance of wire increases as the wire is stretched under a load. By arranging the wires and measuring the resistance, the cell functions as a weighing device of small, compact and accurate design. Temperature does not affect the results obtained—only the resistance produced by the load on the wires influences the data obtained, according to Leeds & Northrup Co.

Cost Cutter No. 28—Bird-Humboldt Centrifugal

A Bird-Humboldt centrifuge installed at the granular plant on an experimental basis by U.S. Potash, Carlsbad, N. M. has proven so successful that it may eventually replace four of Bird Machine Co.'s solid bowl centrifuges which have been used for years. U.S. Potash says that the Humboldt's advantages are many—about one-half the cost of a Bird; and upkeep is apparently much less; capacity is 60% greater, yet requires only 25% as much electric power. And, finally, the Humboldt produces a much cleaner product. Final decision has not been made as yet by U.S. Potash, but the data so far indicates that the Humboldts may take over the job.

For more information on these cost-cutting case histories, circle the number on the card, address and mail to E&MJ.



Cost Cutter No. 29—Self-Unloading Ships Speed Ore Handling at Piers

About 65 belt conveyor self-unloading ore boats are presently in use on the Great Lakes, 22 of them having been built since 1953. The self-unloader lays undisputed claim to two basic advantages—she can unload coal, stone, ore or other bulk materials at any waterfront without elaborate land-based equipment; and she can unload faster than any other boat, according to Hewitt-Robins, Inc.

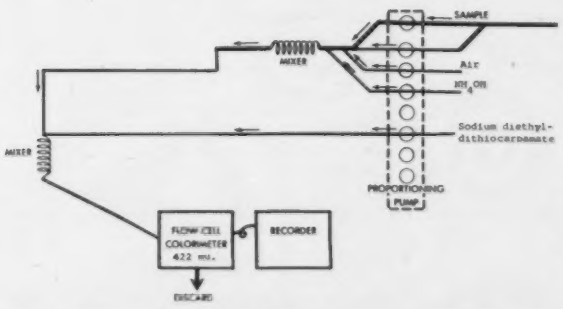
Latest self-unloader is now under construction at the Manitowoc Shipbuilding Co. yard, Manitowoc, Wis. She will be operated on the Lakes by Boland and Cornelius, owners of the world's largest self-unloader fleet. Hull 424 will be 666 ft long, 72 ft beam and 40 ft deep, powered by 7,000 hp steam turbine with coal-fired boiler. Her boom conveyor, built by Hewitt-Robins, will be 6 ft wide and 250 ft long, capable of delivering 5,560 tph. The 144 gates controlling the flow of ore from the holds (see drawing above) will be moved by air controls.

Cost Cutter No. 30—Modern Flotation Machine

When confronted with the problem of either enlarging the existing flotation bank or making the existing machines do more work, Jack Myers, then superintendent at Tennessee Copper Co., decided to try the latter. Working with a glass-fronted No. 24 standard Denver Sub-A, the staff at Tennessee developed what is now the Denver Type M flotation machine. All the flotation cells of normal depth at the mills were changed to the new design and have proved superior in all respects to the various conventional machines then on the market, according to Denver Equipment Co. Copperhill also represents the only active mill using the Pearce deep air cell, which according to Jack Myers is the only machine that can lower a pulp pH without undue holdup in the cell.

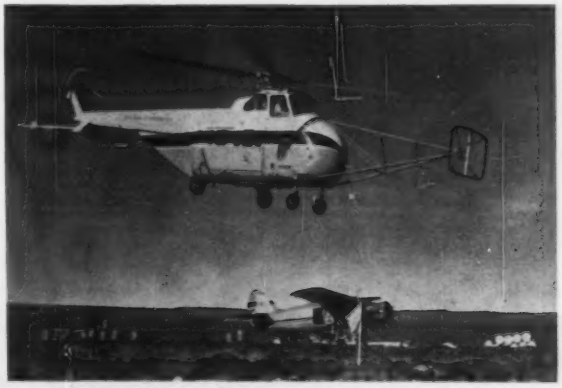
Cost Cutter No. 31—Tough Mining Steel

Rate of wear on mining machines has been reduced to one-half and in many instances to only one-third of former amounts by using a special alloy—Jalloy Grade 3—according to Jones & Laughlin Steel Corp. and Joy Mfg. Co. Performance records were collected from mine superintendents by Joy, and show that Jalloy lasts two to three times longer than medium manganese, medium carbon steels. Against low carbon steel, Jalloy lasted four to five times longer. Jalloy can be welded readily with low hydrogen ferritic electrode and in thicknesses of ¼ to ½ in. does not have to be preheated. Finished welds are ground. For extreme hardness, finished machine parts are carburized to 1/16-in. depth and oil quenched to produce a surface hardness of 62-64 Rockwell C.



Cost Cutter No. 32—AutoAnalyzer For Copper

Copper is determined in wet assay based upon the yellow color formed when sodium diethyldithiocarbamate reacts with the copper in alkaline solution. If a process can be controlled by continually knowing the amount of copper in solution, the flow diagram developed by Technicon Instruments (shown here) can be used. Procedure involves mixing a segmented stream of sample and ammonium hydroxide which in turn is mixed with sodium diethyldithiocarbamate. Stream then enters the colorimeter using a 422μ filter and copper values down to 0.1 ppm are readily determined, recorded and used to control the process. See *E&MJ* August p 44 for more details.



Cost Cutter No. 33—16,000 Miles in 60 Days

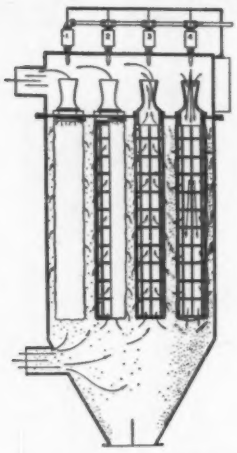
Problem: Exploration for sulphides over large area of northern Canada. Solution: Airborne electromagnetic survey with S-55 helicopter collecting data at tree-top height over muskeg and difficult terrain. By double-shifting the crews and flying from dawn to late Arctic dusk, the 25-man survey team collected data on 16,000 line miles in less than 60 days. Aero Newmont electromagnetic detector used in survey discriminates between types of geologic conductive masses. It was combined with a Gulf magnetometer and scintillation counters, according to Aero Service Corp.

Cost Cutter No. 34—Tough Ripper Points

New point design developed by Electric Steel Foundry Co. for use in ripping applications has proved equally effective in bucket and shovel operations, according to the company. Narrow cutting width on the RDX point gives the machine operator a tooth with pick point penetration that lasts the life of the point. Working in tight, abrasive formations, field tested RDX points produced 141 hours of service before being replaced.

For more information on these cost-cutting case histories, circle the number on the card, address and mail to *E&MJ*.

Cost Cutter No. 35—Cleaning the Baghouse

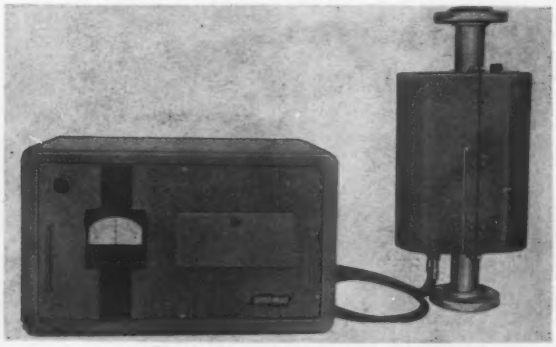


Plagued with the problem of dust particles plugging wool-felt bags in the Mikro-Pulsaire dust collector, Pulverizing Machine Div., Metals Disintegrating Co. solved the problem by coating the bags with Dow Corning 200 Fluid—a silicone—which reduces adhesion of the dust to the wool-felt. Silicone increased the life of the bags and raised filter efficiency to 99.997% on most materials. Metals Disintegrating also uses Silastic gasketing (heat stable to 390 deg F) on each bag.

Cost Cutter No. 36—Blast Furnace Private Eye

An electronic device called the Indicon I-100 has been developed by Nuclear Corp. of America that uses nuclear energy to peer through the hot walls of a furnace to keep a constant check on the level of materials inside. All components are outside the furnace so the instrument is relatively safe from corrosion and mechanical damage. Output signal can be used to actuate automatic furnace controls or can be registered on a control panel. Unit consists of a nuclear source on one side of the furnace and multiple geiger counters on the other.

Joy Mfg. Co. has signed an agreement to manufacture Union Carbide's remote-controlled continuous mining machine.

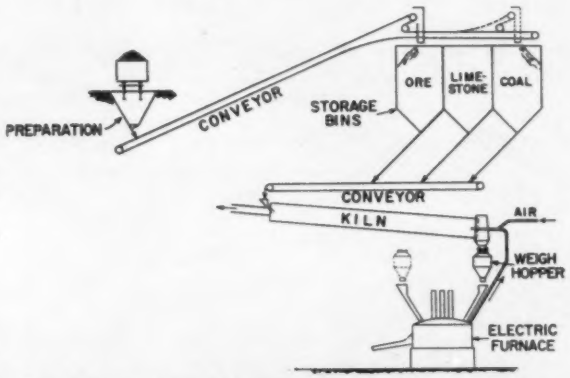


Cost Cutter No. 37—Gamma Gage Watches Slurry

Curtiss-Wright Corp. reports that the C-W Density Gauge consists of a sealed source of nuclear energy mounted to one side of a product carrier or pipe with the radiation detector mounted opposite. Accuracy is 0.001 sp gr of the measured medium and stability is 0.0002 sp gr over a 24-hour period. Algoma Ore Properties, Ltd. depended on hand sampling to measure the specific gravity of the ferrosilicon in the heavy media plant. Personal errors and delays in sampling and measurement did not permit adequate process control. Algoma installed a Density Gauge on the media return line from the drain screens. Mr. Ferguson, sink float plant superintendent, says "the unit does an excellent job in measuring the specific gravity of our medium."

Cost Cutter No. 38—Fresh Water From the Sea

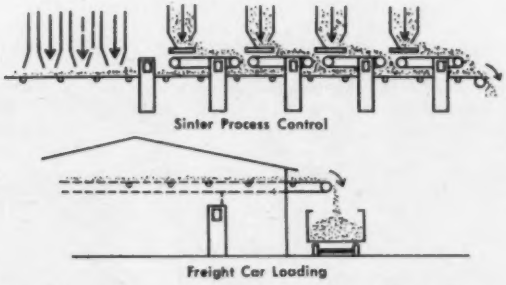
A submerged-coil multiple effect distillation process has been installed on Aruba Island by Singmaster & Breyer. $10-million fresh water and electric project will supply more than 12-million gal water and 15,000 kw electricity per day. Surplus water will be used at Lago Oil & Transport Co., Ltd.'s refinery, a new hotel and resort and by the hydroponic farms that supply all the fresh food for the islands's 55,000 inhabitants. Plant has five lines of six-effect evaporators, each line capable of producing 540,000 gal per day. Fuel will be heavy residual oil from the refinery. Economy of the six-effect process hinges on the fact that 1 lb of steam can produce 4.88 lb fresh water.



Cost Cutter No. 39—Iron By Direct Reduction

After years of experimentation, Strategic Materials Corp. and Koppers Co., Inc. now say that their Strategic-Udy direct reduction process is economic for iron ore. For details see "Electrons and Ions," *E&MJ*, April 1958; Mid-June 1958 and "This Month in Mining," October 1958. Flowsheet above produced these results at Strategic's Niagara Falls pilot plant:

Raw materials—shipping grade iron ore, Pocohontas coal, and lime. Preparation—kiln drying to reduce 35 to 40% of the contained iron to metal at 2000 to 2100 deg F followed by crushing to minus ¼ in. Electric smelting in Strategic's 1000 kva prototype furnace proceeds at average power consumption of 1200 to 1250 kwh per ton. Electrode consumption averaged 25-lb-per-ton metal. Product was 500 tons of semi-steel containing average 1% carbon.



Cost Cutter No. 40—Pneumatic Weigh Cells

Pneumatic force-balance weigh cell named Builders Conveyoflo, by Builders-Providence Div., B-I-F Industries, generates powerful signals requiring no amplification. Instrument is rugged, simple, sensitive and reliable, says the company. Here are two case histories furnished by the company. Conveyoflo meters were installed to automatically control a sintering strand in a major steel plant. One operation calls for one cell to weigh ore and four others to weigh and control additives. Combined load passes over sixth cell that totalizes. Recent 24-hour check showed following results—tonnage on five cells, 4050.7; tonnage recorded on the sixth cell, 4053.5; difference is 2.8 tons or 0.069%.

Conveyoflo meters were used to inventory coal to a power plant. On recent 17-day check two meters recorded 74,848.4 tons, while bills of lading for same period were 74,880.4 tons. Difference is 32.4 tons or 0.0432%.

For more information on these cost-cutting case histories, circle the number on the card, address and mail to *E&MJ*.

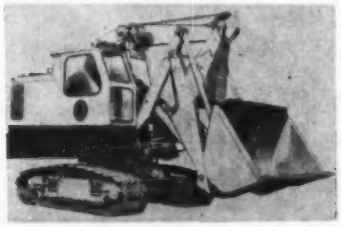
For Your Files

This selected manufacturers' literature is free unless otherwise specified. If item is for sale, send request and money direct to manufacturer.

Exploration and Mining

MINE AND INDUSTRIAL trackwork catalog No. 470 describes Bethlehem Steel Co.'s complete line of items for rails of 20- to 100-lb per yd. made in accordance with American Mining Congress standards. Illustrated in 204pp. **(60)**

MODEL 2300 shovel, the Manitowoc 1½ yd machine that converts to clamshell, hoe, dragline or crane is illustrated in 12 pages. **(61)**



KOEHRING SKOOPER uses the fast swing of an excavator and a 7-ft crowding action to go through a complete loading cycle while standing in one place. Front end loader is available in bucket ranges of 1⅜ to 2½ cubic yd, according to literature available. **(62)**

SPECIFICATIONS for four Maxi Corp. truck crane carriers are available. Trucks are 35, 40 and 45 ton capacity. **(63)**

HIGH PRESSURE RATIO control of induction air allows the Turbocharger to cover a complete range of operating speeds is explained in Caterpillar Tractor Co.'s 6-page bulletin on DW20 and DW21 wheeled tractors. **(64)**

RUBBER-MOUNTED cranes from 15 to 45 ton lift capacity are illustrated in 4-page bulletin from Koehring Div., Koehring Co. Units convert to dragline, clamshell or bucket work. **(65)**

SAFETY POSTERS saying that blasting caps are just as deadly as a rattlesnake are being produced by American Cyanamid Co. with the suggestion that they be posted to prevent children from getting their eager little fingers on them. **(66)**

WIRE ROPE belt conveyor bulletin (948) from Jeffrey Mfg. Co. is four pages. **(68)**

MOBILE LABORATORY for on-the-site soil testing programs is detailed in Soiltest, Inc. bulletin. 16 pp. **(69)**

TONG TEST AMMETERS for ac or dc testing are presented in Columbia Electric Mfg. Co. 8-page catalog. **(71)**

HORIZONTAL weather protected motor bulletin from Louis Allis describes motors in 250 to 2,000 hp rating. 6pp. **(72)**

OPEN TYPE motors, unaffected by moisture, dust, dirt, oil, acids and alkalies, in all integral horsepower frames are illustrated in Allis-Chalmers Mfg. Co. bulletin (05-51B9040). 6pp. **(73)**

SYNCHRONOUS MOTORS and controls from Westinghouse Electric Corp. are presented in 27-page booklet (B-7292). **(74)**

SLIDING MOTOR BASE catalog (V-183-B) from Browning Mfg. Co. says that the bases provide easy and rapid movement of the motor for adjustment through a quick release adjusting screw. 12pp **(75)**

SHAFT-MOUNTED SPEED REDUCERS book 2618 from Link-Belt Co. contains 24 pages of engineering and selection data on single and double reduction drives. **(76)**

ALLISPEDE DRIVE is the trade name of Louis Allis Co.'s new mechanical adjustable speed drive with ranges up to 8:1, according to bulletin No. 3300. **(77)**

FLEXIDYNE dry fluid drive catalog includes the Dodge Mfg. Corp.'s newly extended line of drives (10 stock couplings and 8 stock drives). 24pp. **(78)**

SUBMERGED ARC tandem welding advantages are illustrated in Lincoln Electric Co. bulletin 5200.2. 4pp. **(79)**

WIRE AND POWDER sprayed coatings of metals and ceramics are detailed in Metallizing Engineering Co., Inc. bulletin (136A). 8pp. **(80)**

WELDING SUPPLIES and accessories catalog from Air Reduction Sales Co., Air Reduction Co., Inc. is illustrated in 52 pages. **(81)**

AUTOMATIC mechanical handling device—the Cranehand that has a capacity for 9 ton loads up to 50-in. wide is presented in American Forge & Mfg. Co. 4-page bulletin. **(82)**

WELDED AND RIVETED metal gratings are the subject of a 20-page data and specification manual prepared by Klemp Metal Grating Corp. **(83)**

PLAN '59 *Modernize now for growth and profits*

A special report to world-wide mining from *E&MJ*. Not good after May 1, 1959. For more information on these cost-cutting case histories circle proper number, address and mail to *E&MJ*.

Cost-Cutting Case Histories

1	9	17	25	33
2	10	18	26	34
3	11	19	27	35
4	12	20	28	36
5	13	21	29	37
6	14	22	30	38
7	15	23	31	39
8	16	24	32	40

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60	70	80	90	100
61	71	81	91	101
62	72	82	92	102
63	73	83	93	103
64	74	84	94	104
65	75	85	95	105
66	76	86	96	106
67	77	87	97	107
68	78	88	98	108
69	79	89	99	109

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E&MJ NEW PRODUCTS DIGEST (*Continued*)

Metal and Mineral Processing

STEEL CABINET for office, store, club or plant use, are illustrated in Penco Div., Alan Wood Steel Co. bulletin B-50. 4pp. **(84)**

BUCKET ELEVATORS from Bucket Elevator Co. are discussed in 4-page bulletin. **(85)**

LIQUID ION EXCHANGER—R&H Amberlite LA-1, an amine—is thoroughly examined in Rohm & Haas Co. bulletin. 17pp. **(86)**

SILICONE ANTIFOAMS available from Hodag Chemical Corp. are discussed in literature available from the company. **(87)**

CYCLONE APEX CONTROLS brochure from Equipment Engineers Inc. is 4 pages. **(88)**

EQUIPMENT for the process industry is listed in Fuller Co. bulletin G-3B. 12pp. **(89)**

MICRODYNE dust collector is illustrated in 12 pages by Joy Mfg. Co. **(90)**

PROCESS EQUIPMENT available from Hardinge Co. is listed and illustrated in an 8-page bulletin. **(91)**

TECHNIQUES for making accurate pH determinations under troublesome conditions are the subject of an application data sheet (pH-85-MI) from Beckman. 5pp. **(92)**

CHEMISTRY OF CYANIDATION prepared by American Cyanamid Co. deals with the complex chemistry of gold and precious metal ores. Thorough. 54pp. **(93)**

COLLECTION AND RECOVERY OF INDUSTRIAL DUSTS is the title of one bulletin available from Buell Eng. Co., Inc. Other bulletins are available on the cyclone, electrostatic precipitator and the fly ash collectors. **(94)**

LABORATORY SUPPLIES and equipment catalog available from Chemical Rubber Co. is completely revised and now contains 1273 pages. Catalog 400 contains over 8,000 listings. **(95)**

FEEDWATER EQUIPMENT designs and methods—a reprint of Leonard Limon paper from *TAPPI Vol. 41, No. 6*, June 1958—describes the modern day methods of preparing feed water for high pressure boilers. 6pp. **(96)**

COOLING COILS, direct expansion types in both standard and cleanable tube water coils, are illustrated in American Air Filter Co. bulletin 880. 48pp. **(97)**

HOW TO SELECT steam traps and other fluid specialties is the title of a bulletin prepared by V. D. Anderson Co. 36pp. **(98)**

HOW LOAD CELLS in the Emery hydraulic tank weighing system indicate and control tank weighing is the subject of bulletin 581 from A. H. Emery Co. 12pp. **(99)**

HANDBOOK ON DEMINERALIZING is a 40-page book prepared by Cochrane Corp. Illustrated, thorough. **(100)**

LOUISVILLE STEAM TUBE dryers —their application, design and construction—is the subject of a 21pp. bulletin prepared by General American Transportation Corp. **(101)**

TWO NEW leaf type pressure filters are discussed in T. Shriver & Co., Inc. *Filter Facts*, Vol. 9, No. 1. 4pp. **(102)**

PORTABLE submersible electric pumps for mining are introduced in literature available from Stenberg Mfg. Co. **(103)**

VARIABLE displacement Internal-External Pump (VIEP) developed by Pesco Products Div., Borg-Warner Corp., has only two moving parts. Advantages, applications and sizes are listed in 4 pages. **(104)**

HANDBOOK OF COLD DRAWN buttweld mechanical steel tubing published by Pittsburgh Tube Co. contains pertinent metallurgical, mechanical and engineering data in 60 pages of text and 75 photos and drawings. **(105)**

USE OF MAGNESIUM in the electronics industry is the title of a new booklet issued by the magnesium department of Dow Chemical Co. 20pp. **(106)**

MICROSCOPE accessories for electron or light equipment of all types are listed in Ernest F. Fullan, Inc. catalog. **(107)**

SPECTRO-CHEMICAL ANALYZERS—the Quantrol and Production X-ray Quantometer—are detailed in literature available from Applied Research Laboratories, Inc. **(108)**

ALUMINUM CHEMICALS available from Reynolds Metals Co. are set down in an indexed 48-page catalog. **(109)**

SODIUM CHLORATE — properties and safe handling practices—a bulletin prepared by Pennsalt Chemicals Corp. Washington Div. 12pp. **(67)**

Special Employment Notice

ENGINEER TAX MEN, a publication prepared by the U.S. Internal Revenue Service, tells all about the job, qualifications, salaries and the growing importance of this new kind of engineer. If interested, write to the Assistant Commissioner (Technical) (attention T:S:E:), Internal Revenue Service, Washington 25, D. C.

PLASTIC WIRE COUNTERED PRIMACORD

A strong, tough Primacord, armored with wire and covered with a plastic material. Recommended for use in deep, ragged holes or with metal or fibre explosives containers, where strength and resistance to abrasion and cutting are essential. Tensile strength 300 lbs. 1000-ft. spool 32 lbs.

PLASTIC REINFORCED PRIMACORD

Covered with tough plastic material, not affected by high Summer heat or Winter cold. Waterproof — resistant to acids commonly encountered. Use for extremely deep holes, river crossings, field shots that must stand for long periods of time and in other wet conditions. Tensile strength 275 lbs. 1000-ft. spool 22 lbs.

REINFORCED PRIMACORD

Textile reinforced, tough, resilient, flexible. Recommended for surface trunk lines and deep holes where normal strength and resistance to abrasion and cutting are needed. Tensile strength 160 lbs. 1000-ft. spool 19 lbs.

PLAIN PRIMACORD

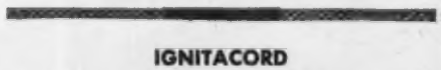
Textile-covered, flexible and resilient. Suitable for surface trunk lines and shallow holes where tensile strength and resistance to abrasion and cutting are not required. Tensile strength 125 lbs. 1000-ft. spool 18 lbs.

DETACORD

Smaller (and less powerful) than Primacord. Core of PETN is textile-reinforced and wax finished. Identified by light brown surface with cross windings of red yarn forming an "X" pattern. Resilient, flexible. An economical detonating fuse for use in secondary blasting, long hole underground blasting and pipe-line ditching. *Not* recommended for primary blasting. Tensile strength 100 lbs. 500-ft. spool weighs 8 lbs.; 1000-ft. spool weighs 16 lbs.

QUARRYCORD

Used to connect and ignite safety fuse in secondary blasting. Burns progressively with an external flame at the zone of burning — about one foot per second. Flexible — not affected by stray currents. 500-ft. spools, 1000 feet to the carton. Fuse Connectors — 100 in a box.



IGNITACORD

Used for connecting and igniting safety fuse in rounds. Burns progressively with a short hot external flame at the zone of burning. Type A, 8 to 10; Type B, 16 to 20 seconds per foot. 100-ft. spools. Fuse Connectors — 100 in a box.

Detonating Fuse: It functions as the detonating agent throughout the entire blast. It operates as the priming agent in each load, and serves to connect all loads in planned sequence of detonating. It consists of a core of PETN enclosed in various textile or plastic coverings. It cannot be set off by normal vibration or friction, ordinary impact or sparks, but must be detonated with fuse and cap or electric blasting cap. Of particular importance is the fact that it is not affected by stray electrical currents — and a direct hit by lightning failed to detonate Primacord.

Ignitacord and Quarrycord: These products function as Safety Fuse igniters, to be used only as described.

With PRIMACORD® • DETACORD® QUARRYCORD® • IGNITACORD®

Detonating Fuse Recommendations

CONDITIONS	PRIMACORD				DETACORD
	Plain	*Reinforced*	*Plastic Wire Countered*	*Plastic Reinforced*	
Jackhammer holes	X				
Shallow well-drill holes	X				
Secondary blasting	X				*
Deep, ragged holes		X	X	X	
Extra deep holes			X	X	
Deep, wet holes			X	X	
When a field shot must stand a long time			X	X	
River crossings			X	X	
Loading with heavily reinforced explosives containers			X		

*DETACORD is also suitable for use in Pipeline Ditching and Underground Long-hole Blasting.

For your Trunk Line, Plain Primacord serves in most cases. You can use Reinforced Primacord to advantage, especially where the going is rough.

For more information see your Explosives Supplier, or write to

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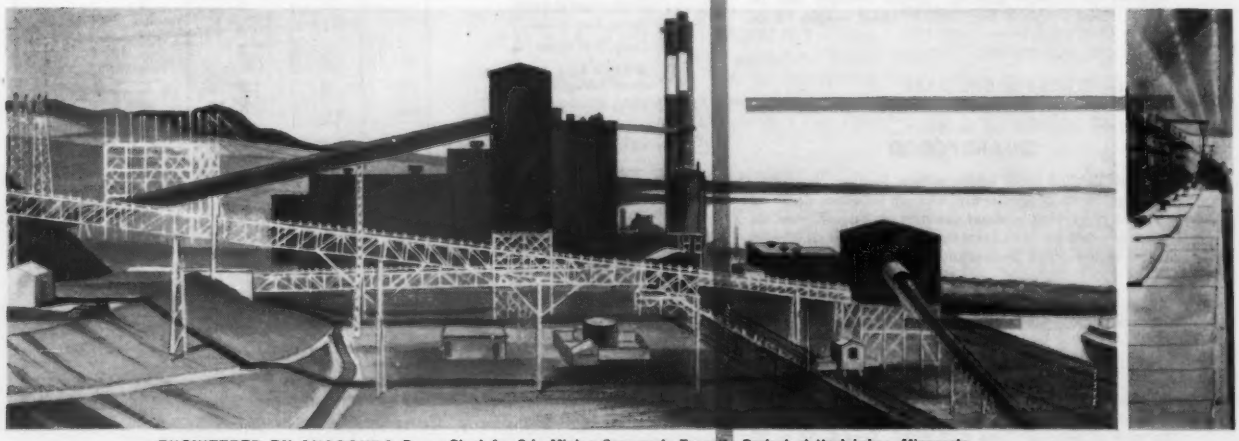
Announcing:

A new Anaconda subsidiary offering a half-century and a billion dollars' worth of experience in design and engineering for industrial construction

Anaconda-Jurden Associates, Inc., formerly Anaconda's Engineering Department, now offers the complete services of its experienced staff to industry generally.



ENGINEERED BY ANACONDA: Power Plant for Erie Mining Company's Taconite Project at Hoyt Lakes, Minnesota.

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ENGINEERED BY ANACONDA: Integrated Brass Mill, The American Brass Company, Los Angeles, California.

ENGINEERED BY ANACONDA: Uranium Processing Plant of The Anaconda Company, Grants, New Mexico.

ENGINEERED BY ANACONDA: Reduction Plant, Anaconda Aluminum Company, Columbia Falls, Montana.

ENGINEERED BY ANACONDA: Concentrator Grinding Bay, Chile Exploration Company, Chiquicamata, Chile.

For more than fifty years, Anaconda has been in the business of designing and engineering some of the largest metallurgical and industrial plants in the Western Hemisphere—over a billion dollars' worth since World War II.

Anaconda's engineering department has not only built plants for the parent company and its many subsidiaries, but for other companies as well. Projects have included the design of the plant proper and such adjuncts as power plants, transmission lines, complete townsites, bridges, road systems, warehouses, offices, laboratories, water supply and sewage disposal systems.

This highly experienced engineering staff has now been formed into a new Anaconda subsidiary—Anaconda-Jurden Associates, Inc.—so that its services can be extended more readily to other clients.

Wilbur Jurden, president and chief engineer of the new concern said, "The development of a well-coordinated team of design specialists requires years working together on the attainment of common goals. Ours is a balanced staff of over 200 highly trained engineers eager to accept new challenges in the design, engineering, and construction of any major industrial facility."

The formation of Anaconda-Jurden Associates is another major step in Anaconda's continuing efforts to provide better service and products for American industry.

If you would like to learn more about Anaconda-Jurden Associates, Inc., send for a complimentary copy of our brochure, "Landmarks of Industrial Engineering." Simply write to Anaconda at 25 Broadway, New York 4, N. Y.

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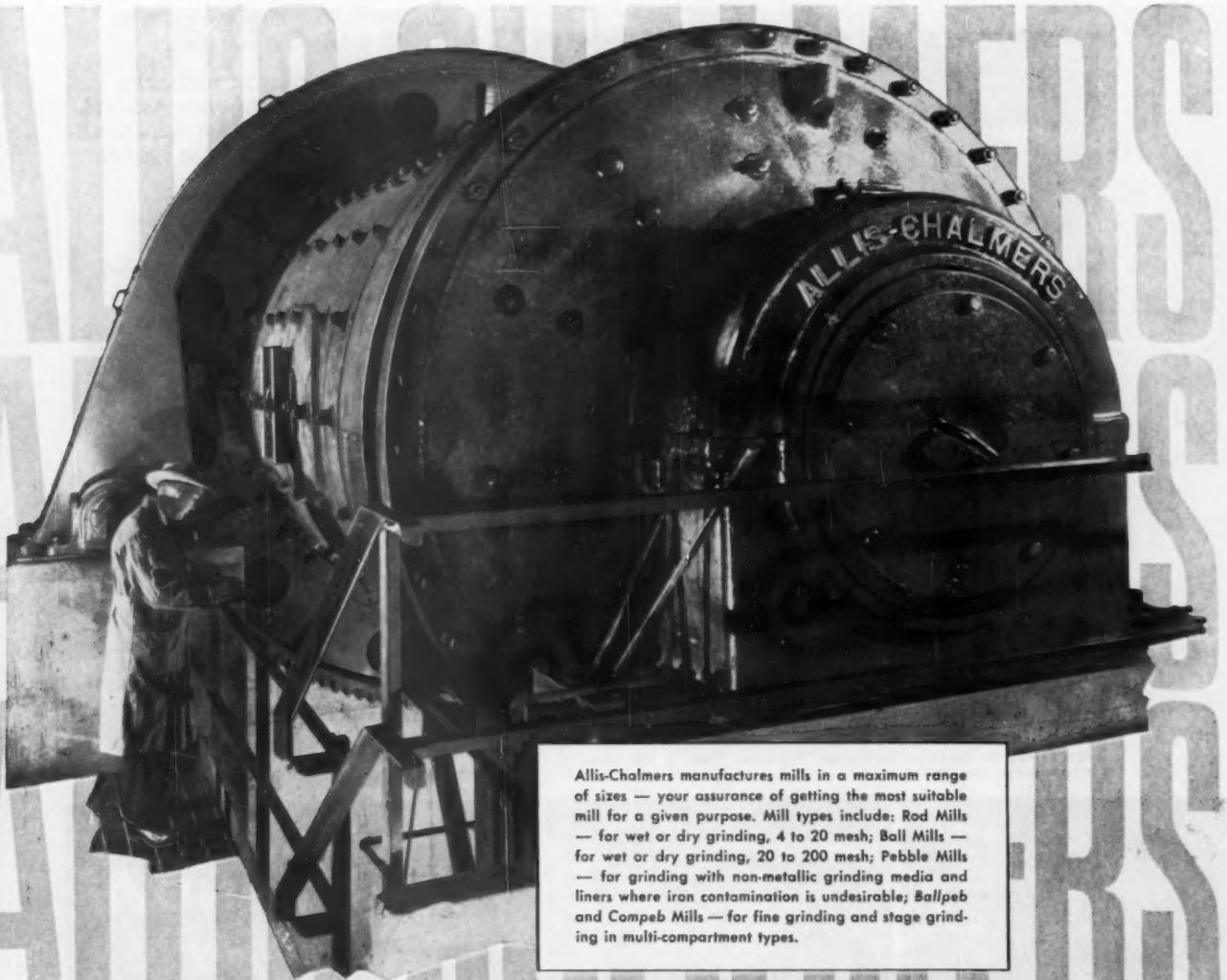
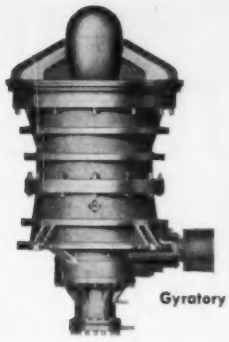
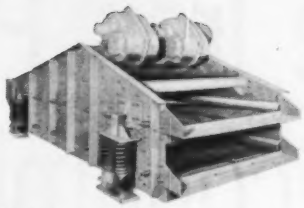


Allis-Chalmers manufactures mills in a maximum range of sizes — your assurance of getting the most suitable mill for a given purpose. Mill types include: Rod Mills — for wet or dry grinding, 4 to 20 mesh; Ball Mills — for wet or dry grinding, 20 to 200 mesh; Pebble Mills — for grinding with non-metallic grinding media and liners where iron contamination is undesirable; *Ballpeb* and *Compeb* Mills — for fine grinding and stage grinding in multi-compartment types.

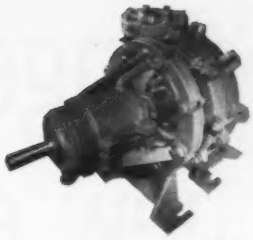
ALLIS-CHALMERS



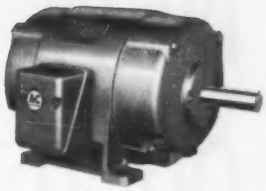
Gyratory Crushers



Screens



Rubber-Lined Pumps



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ONLY Allis-Chalmers builds processing machinery and matched electrical equipment for the mining industry

Maximum mill efficiency is the product of plant design, material flow, close coordination of all processing equipment, careful matching of processing equipment with supporting electrical equipment, power supply, maintenance. All these factors are carefully considered before Allis-Chalmers makes equipment recommendations. And *no other company* makes both mechanical and electrical equipment for the mining industry. *Only* Allis-Chalmers has the facilities and experience to apply and coordinate all equipment for a complete mill.

Help from a technical team. Before a recommendation is offered, a careful study of all the requirements and variables is made by an Allis-Chalmers team of research, design, manufacturing and application specialists. Where necessary, special problems are worked out in our pilot plant facilities. Finally, all information is assembled and acted on by our mining industry application department. Our resulting recommendation promises you complete plant efficiency backed by Allis-Chalmers responsibility for the entire installation.

Call your nearby Allis-Chalmers representative to arrange for a cooperative effort between A-C and you or your consultants. Or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

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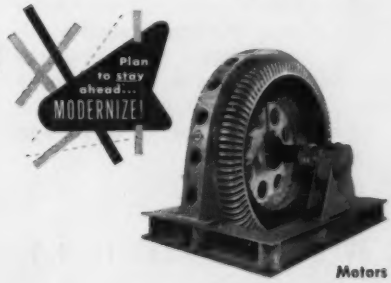
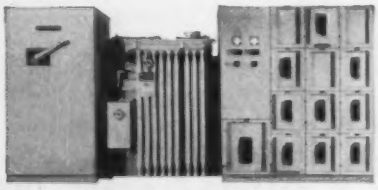
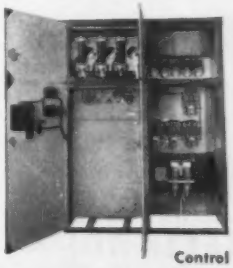


Motors



Unit Substations



Control

ALLIS-CHALMERS

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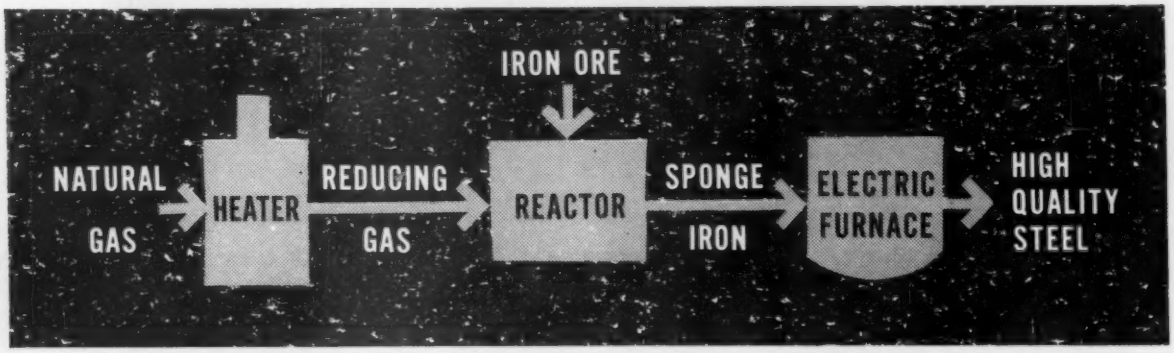
NEW Sponge Iron Process opens new economics– new areas of operation for steel making



A steel industry based on iron ore and natural gas or petroleum is economically and operationally practical using a direct reduction process available through The M. W. Kellogg Company, exclusive world-wide sales and licensing agent. The process yields a sponge iron which can be substituted for the pig iron or scrap charge to electric or other melting furnace.

The success of the sponge iron process has been firmly established in a 30 ton per day pilot plant and a 200 T/D production plant operated by Fierro Esponja S.A., an affiliate of Hojalata y Lamina S.A.—one of Mexico's principal steel producers. Based on the success of the present plant, HyL has awarded Kellogg a contract to engineer and construct a 500 T/D plant incorporating further improvements in thermal efficiency and materials handling.

Reduction of ore to sponge iron occurs in a controlled-atmosphere reactor. Neither coal nor limestone is required. Small, low-investment plants can be designed to meet practically any need and can be constructed at far below the cost of a blast furnace. The process was developed by Hojalata y Lamina—parent company of Fierro Esponja. The problems of economically obtaining a reducing agent from natural gas or petroleum, and of engineering and constructing the 200 T/D plant, were solved by Kellogg on the basis of its extensive experience in furnace engineering and hydrocarbon processing.

The M. W. Kellogg Company is a world-wide organization which specializes in engineering and constructing plants involving complex chemical processes. This experience qualifies Kellogg to engineer and construct plants using the sponge iron process. For those desiring further information, a booklet explaining the sponge iron process in more detail is available. Arrangements for screening a motion picture showing the sponge iron process in action may also be made by writing The M. W. Kellogg Company.

KELLOGG

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In many operations where wire ropes occasionally operate near their breaking strength, it will pay you to switch to Double Gray. If you use Double Gray on your present equipment, under equal load conditions, you'll get a safer, more economical operation. That's because Double Gray's higher strength* allows you to operate with a greater safety factor—resulting in longer rope life and less equipment downtime.

* *Wickwire Double Gray Wire Rope is made of extra-improved plow steel. Fortified by an independent wire rope core of the same extra high strength steel, Double Gray rope has a 15% higher breaking strength than the catalog breaking strength of an improved plow steel rope with IWRC.*

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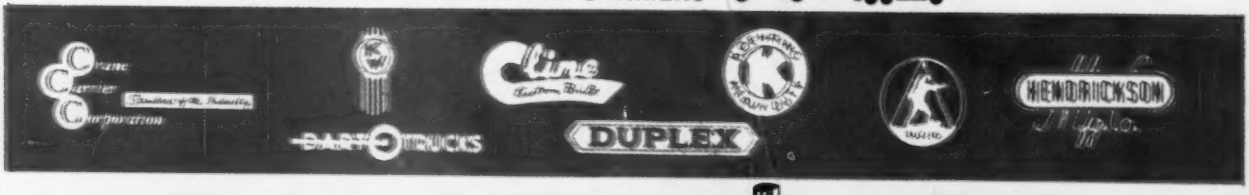

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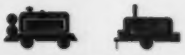

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GM Diesel engines are available in more than 1800 different applications of power equipment

Mining operators agree that engine standardization pays big dividends. The wide use of GM Diesel engines in more different makes of equipment than any other Diesel provides unequalled opportunities for standardization—and the fact that GM Diesel covers the range from 30 to 893 H.P. with *only 3 cylinder sizes* results in highest parts interchangeability, lowest maintenance cost. Write for booklet, "STANDARDIZE YOUR POWER"—and learn the reasons why.

DETROIT DIESEL ENGINE DIVISION OF GENERAL MOTORS, Detroit 28, Michigan

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

GM
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IT PAYS TO STANDARDIZE ON...

What this tag on OKOCORD portable cords and cables means to you

This "QC" (Quality Control) tag, the final one of a series, is Standard Operating Procedure for every length of OKOCORD **before** it is shipped out to you. It's your assurance that Okonite's modern equipment, skilled craftsmanship and overall Quality Control program combine to build more **value** into OKOCORD portable cords and cables.

Here are six other steps, typical of all OKOCORD manufacturing operations, where quality is constantly checked and maintained by the Quality Control Lab and every operator and supervisor in the plant.

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2. **Strands are continuously drawn, annealed and steam cleaned with every run passed for size, strength, flexibility.**
3. **Compounds are mixed, milled, strained and refined in a continuous mechanized sequence to help eliminate error.**
4. **Microscopic examination of compound batches, in addition to physical and electrical tests, checks particle dispersion and authenticates compounding.**
5. **Latest type of continuous lead extruder eliminates damaging press stops in applying continuous mold for vulcanization—guarantee of OKOCORD's "tire-tread" toughness.**
6. **Okonite QC imposes the most rigorous tests in the industry, in process and final.**

Each reel of OKOCORD bears this quality control tag. It's your assurance that the OKOCORD you buy will be a long-term investment. The Okonite Company, Passaic, N. J.

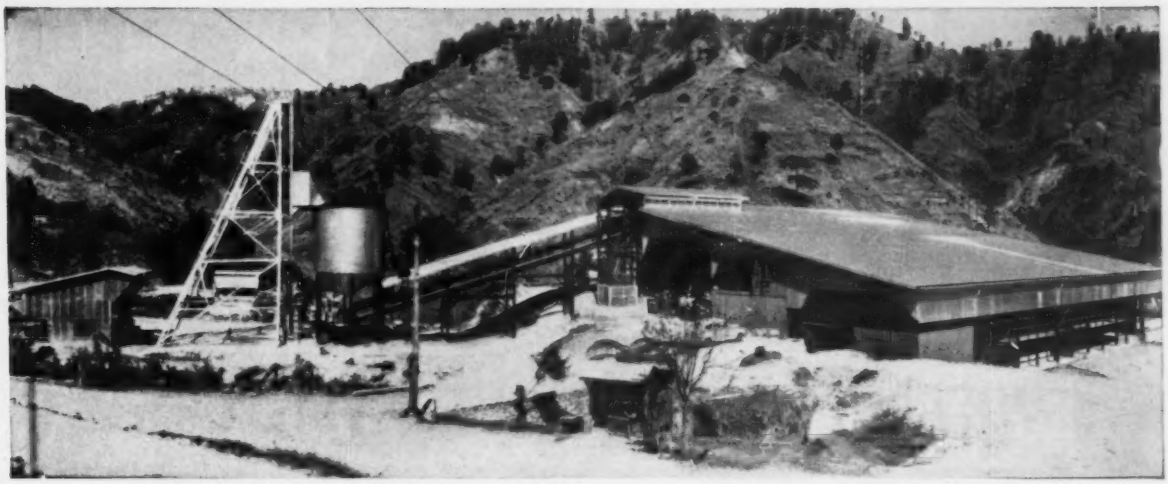
Buy through your distributor.

Write for this newly-published 64-page catalog on OKOCORD. Full information on construction components, cable assemblies, dimensional tables, engineering data plus splicing and terminating drawings and instructions.

where there's electrical power . . . there's **OKONITE CABLE**

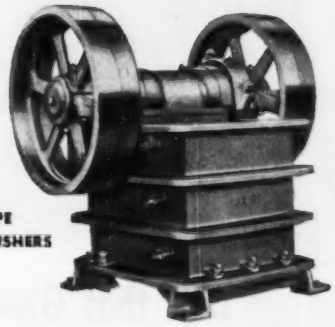
6379

MINING EQUIPMENT



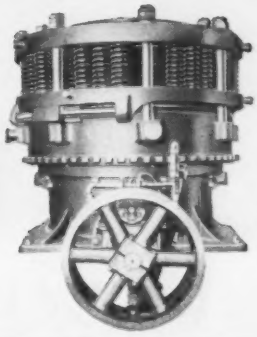
Baguio Gold Mining Company's mill in the Philippine Islands uses all of the Telsmith equipment shown below.

BY TELSMITH



JAW TYPE PRIMARY CRUSHERS

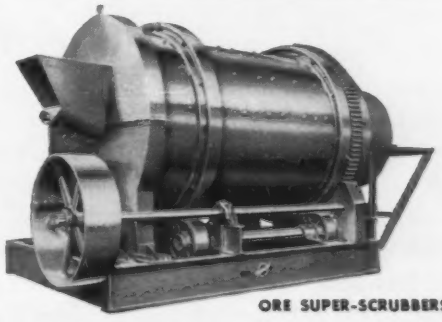
SEND FOR DESCRIPTIVE BULLETIN 266



GYRASPHERE SECONDARY CRUSHERS

VIBRATING SCREENS

Min. 39



ORE SUPER-SCRUBBERS

SMITH ENGINEERING WORKS

502 E. CAPITOL DRIVE **MILWAUKEE 1, WISCONSIN**

Representatives in Principal Cities in All Parts of the World • Cable Address: Sengworks, Milwaukee

WHY BUY ONLY ⅔ OF A CONVEYOR BELT?

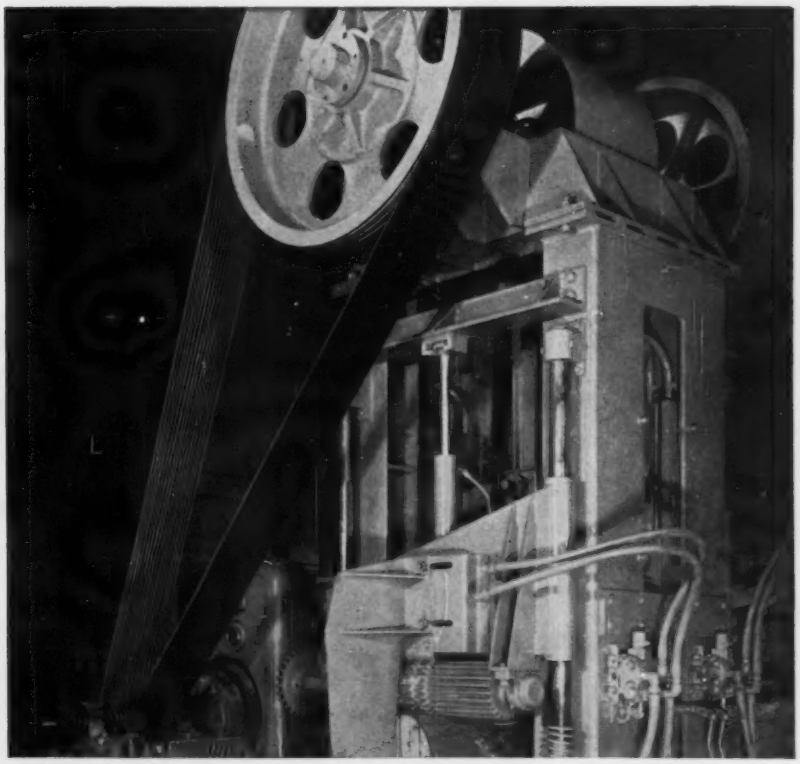
It's the Last Third of an R/M Conveyor Belt that Gives

. . . "More Use ~~per~~ *for Your* Dollar"

R/M engineers recognize that *every* belt feature — troughability, resiliency, fastener-holding ability, strength member fabric, cover toughness and thickness — all help to determine the true cost of conveyor belt on your job. That's why each component part of Ray-Man Conveyor Belt is precision proportioned to assure better belt balance where it pays off most for you — in *longer* — ⅓ longer — belt service life! These features make the difference!

- Trains Naturally — Handles Fuller Loads
- Resists Impact and Ripping — Takes Abusive Loads
- Double Compensation — Relieves Outer Ply Stress — Flexible
- Holds Fasteners — Requires No Breaker Ply
- Exclusive "XDC" Cover—Protects against Wear, Tear, Cuts and Abrasion
- Moisture and Mildew Resistant

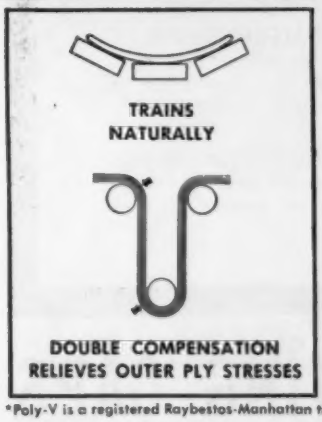
Extra cushioned Homocord and rugged R/M Tension-Master also give you longer belt service life. Write for Catalog 25 CB.



R/M POLY-V® DRIVE— New, patented heavy duty Poly-V* Drive delivers up to 50% more power in the same space as multiple V-drive . . . or equal power in as little as ⅔ the space. Single unit belt design eliminates multiple V-belt "length matching" problems. More constant speed ratios, less wear on belt and sheaves, smoother running. Write for Bulletin #6638.

HOMOFLEX HOSE— Light, strong, "flexible as a rope" . . . easiest handling hose made for air, water, other fluids and gases. Mandrel-made *without* pre-set twist. Resists kinking, coils and uncoils freely in *any* direction. Homogeneous tube-to-cover bond; never any separation. Uniform inside and outside diameters for easy coupling. Write for Bulletin #6879.

Courtesy of the Ingalls Shipbuilding Corporation



*Poly-V is a registered Raybestos-Manhattan trademark.

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If You Use Blasting Caps

EXAMINE THESE FEATURES

1 DEPENDABLE FIRE—Special alloy is used as the bridge wire in the firing element of Hercules Electric Blasting Caps. Wire is noncorrosive.

2 ENGINEERED SHELL—Bronze shell of a Hercules cap goes through fifteen separate operations while it is being expertly shaped.

3 TOUGH, HIGH DIELECTRIC INSULATION—Leg wires of Hercules caps are coated with plastic insulation for outstanding toughness, resistance to abrasion, superior dielectric qualities.

4 SECURELY ANCHORED—A cast sulfur plug in the upper part of shell anchors entire firing mechanism in place.

5 WATERTIGHT WATERPROOFING—A special Hercules waterproofing formulation minimizes the possibility of moisture or dampness penetration.

6 7 DOUBLE-PACKED WALLOP—Bridge wire extends into the priming charge and makes positive contact to give rapid ignition.

XR58-1

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Partners in Dependability with Hercules® Explosives

HERCULES POWDER COMPANY
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SMIDTH

rotary kilns...
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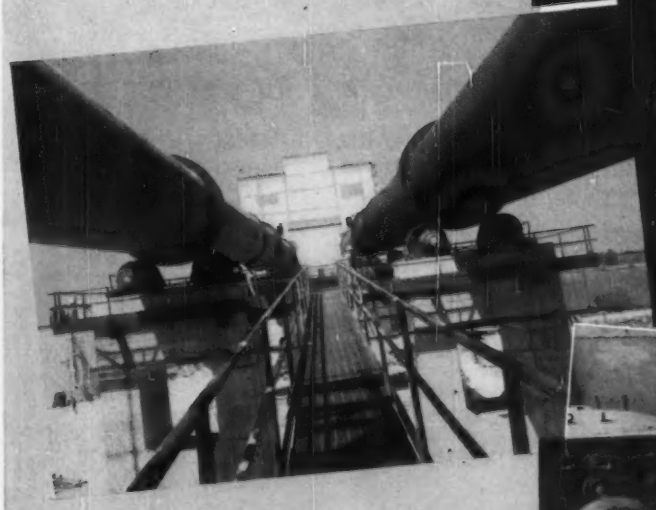

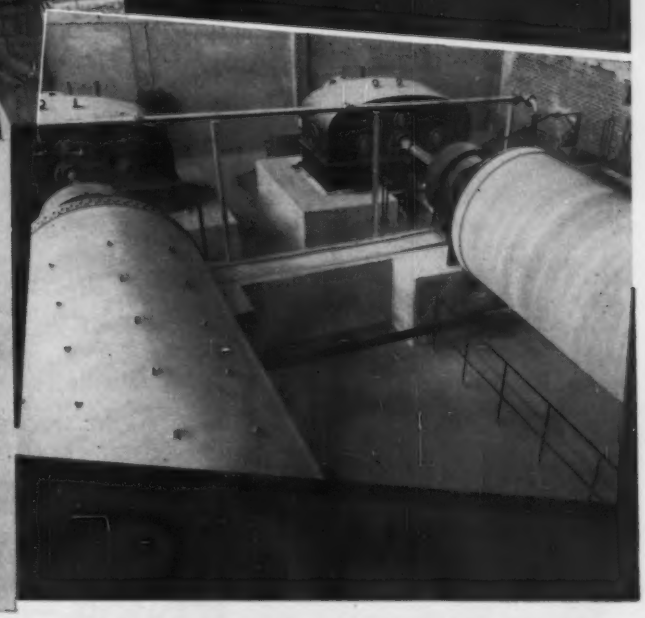

F. L. SMIDTH & CO.

Engineers and Machinery Manufacturers

11 WEST 42nd ST., NEW YORK 36, N. Y.

All around . . . underground . . . GARDNER-DENVER keeps production stepping

In blast hole drilling . . .

DEEP HOLE DRILLS—developed especially for the job. Some mine properties report breakage costs reduced as much as 75% using Gardner-Denver deep hole drills.

DRIFTERS—a choice of hammer diameters from 2¾" to 4½", with feeds and controls for drilling in any type of rock. Outstanding in hole-cleaning ability, air economy and drilling speed.

AIR FEED LEG DRILLS—lightweight drilling combination designed for ease of operation. Controls are grouped on drill backhead. Two models: FL48 and FL58.

SINKERS—a complete line. Lightweight models for secondary breakage and heavy-duty drills for shaft sinking.

STOPERS—Three rugged models. All available in your choice of feeds, controls and chuck construction.

In quality drill steel . . .

SECTIONAL DRILL RODS—highest quality . . . shot-peened and carburized to stand the down-the-hole gaff longer.

RING SEAL SHANKS—replace old-type water swivels without adding additional length to drill.

COUPLINGS—extra long, extra hard threads for longer drilling life.

With air power . . .

ROTARY PORTABLE COMPRESSORS—five sizes, wheel- or skid-mounted.

STATIONARY WATER-COOLED COMPRESSORS—single- and two-stage units in capacities to 1854 cfm.

In mucking operations . . .

MINE CAR LOADERS—four rugged, high-capacity loaders with fast action and plenty of mucking power. Models to meet various headrooms and car sizes. Safe, easy to use . . . have low center of gravity.

"AIRSLUSHERS"—three Gardner-Denver load-lugging slusher hoists available. Powered by high-torque, five-cylinder radial air motors. Motor and drive completely enclosed to keep out dirt and water.

In jumbo drilling setups . . .

HYDRAULIC DRILL JUMBOS—rail-mounted jumbo units with one, two or three booms, in your choice of drills and feeds.

JMT "MOBILJUMBO"®—a self-propelled, push-button drilling unit. Available with two or three booms . . . with drills and feeds to suit your ground.

JUMBO COMPONENTS—build your own jumbo with Gardner-Denver drills, feeds, hydraulic booms, remote controls and drill positioners. A combination for every drilling need.

Plus . . .

Bit Grinders • Centrifugal Pumps • Grout Pumps • Air Hoists • Columns • Drill Steel Shapers and Sharpeners • Sump Pumps • Maintenance Tools • Oil Forges • Air Line Oilers • Air Motors

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

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News about Allis-Chalmers construction machinery . . .

Tractor power helps build Navajo Dam...40 stories high

Morrison-Knudsen Co., Inc. is sponsoring contractor on the Navajo Dam job in a joint venture with Henry J. Kaiser Co. and F & S Contracting Co.

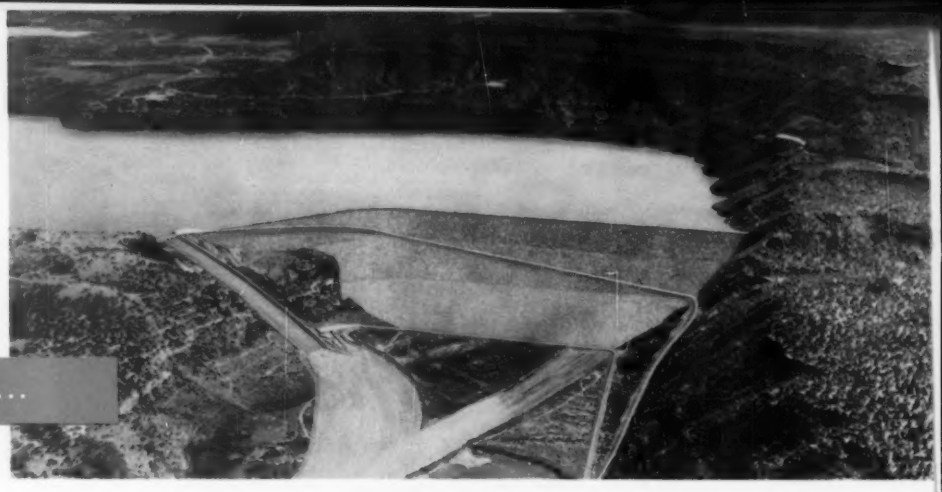
Right now, the dam you see here exists only in the minds of its builders. Spanning a sun-baked canyon in New Mexico, it will create a lake 37 miles long . . . enough water to irrigate many thousands of thirsty acres. But towering Navajo Dam, one of the world's largest earth-fill structures, will take four more years to complete. Sponsoring contractor is world-famous Morrison-Knudsen . . . already moving the first of 26 million yards of dirt and rock that will test tractor performance and dependability as severely as any job can. M-K's choice — big Allis-Chalmers crawlers with turbocharged diesel power, hydraulic torque converter drive, and the toughest track ever made. Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

Construction Machinery Division • Engine-Material Handling Division • Farm Equipment Division • General Products Division • Industrial Equipment Division • Nuclear Power Division • Power Equipment Division • Allis-Chalmers International

POWER **FOR A GROWING WORLD**

OVER



How it will look—The finished dam will be 3800 feet wide, 3200 feet thick at its base . . . and will create the biggest body of water in New Mexico.

picture report.....

Allis-Chalmers big HD-21's get Navajo Dam under way

24-foot-wide dozing team—Torque converter HD-21's match power and speed precisely, as they work together to push huge mounds of dirt and rock over the cliff to prepare for construction of a spillway.

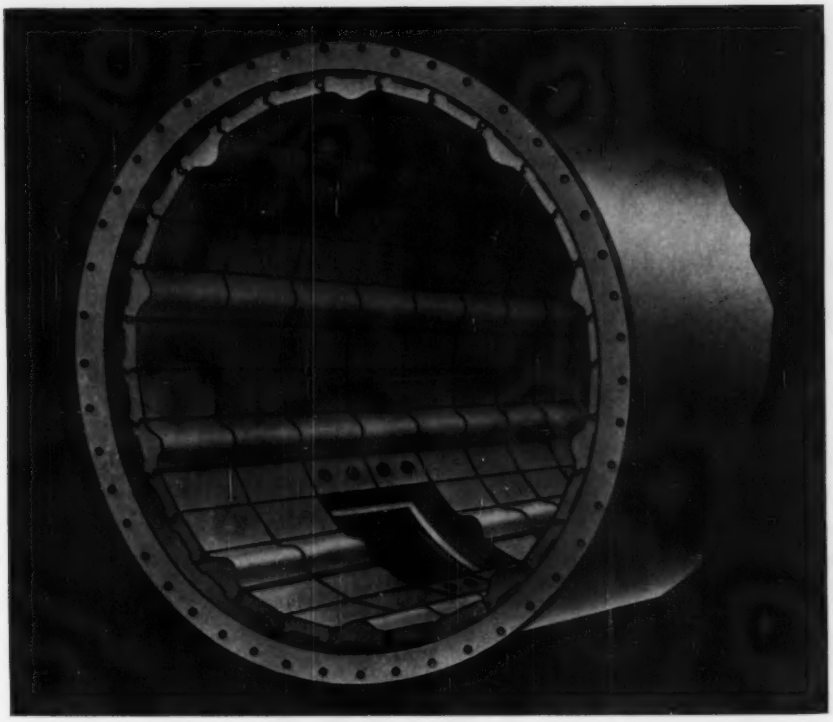
No worries about river work—Positive-seal protection of vital track parts lets the HD-21's doze rock from the river bottom to form approaches for a temporary bridge without fear of lubricant loss or track damage.

Heavy-duty power for heavy-duty haul roads—Big Allis-Chalmers Forty Five motor graders fit the Navajo job to a "T." Clean, uncluttered design lets operator see both ends of the moldboard easily as he cuts a roadside ditch.

Four plus yards at a crack—This Allis-Chalmers HD-21G, biggest tractor shovel available anywhere, is helping to load about 40,000 yards of rock and dirt to clear the way for construction of a diversion tunnel.

See for yourself why Allis-Chalmers equipment was chosen for the Navajo Dam job. Your Allis-Chalmers dealer will demonstrate machines to fit your requirements . . . on your job—no obligation. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin

ALLIS-CHALMERS ***POWER*** **FOR A GROWING WORLD**



"You Can Reduce Grinding Costs and Improve Mill Performance with Long-Lasting B&W Universal Liner Plates

B&W Universal Liner Plates can reduce your cost per ton of material ground. They're easy to handle, store and install, wear longer and more evenly, and require less replacement."

Here's why:

1. **Lower Initial Costs.** Standardization eliminates chiller and pattern costs.
2. **Reduced Costs In Liner Inventory.** Standardization is possible because one design fits all diameters of mills. Standardization means quicker unloading and storage.
3. **Longer Life For Liners.** Better quality control on a mass production casting, utilizing permanent molds, results in uniform wear. Ideal size for uniform chill and heat-treatment.
4. **Reduced Costs In Determining Most Efficient Wear Patterns.** You can get wear profiles consisting of all lifter ribs or all flats from the same castings, as well as a combination of both including straight or spiralled lifter pattern.
5. **Longer Life For Different Applications.** This is assured by selection of proper materials. Design is suitable for either chilled irons or wear steels.
6. **Reduced Costs In Both Direct Labor and Outage.** Installation time is less because small size and weight of castings allows them to be handled easily, without cranes and with less fatigue for workers. Also, liners can be installed without turning the mill.
7. **Reduced Costs In Storage Space.** Because small castings stack easily, little storage space is required. One design of casting interchangeable for all size mills also simplifies records.
8. **Reduced Costs On Breakage Claims and Delays For Replacements.** Small castings are rugged and almost impossible to break by handling. Large castings of hard, brittle irons sometimes break in shipment.

Liners are supplied in two nominal thicknesses, 1½" and 3" with 1½" high lifters. Castings are 6" wide x 12" long. Positive seating of small castings on mill shell means less breakage of castings under operating conditions.

For additional information on B&W Universal Tube Mill Liner Plates, write The Babcock & Wilcox Company, Process Equipment Department, Barberton, Ohio.

S-478

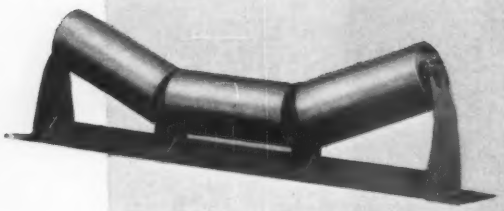
BABCOCK & WILCOX

BOILER DIVISION

Link-Belt's

EVEN

New line has over 630 types and sizes ...new designs, new numbers



SERIES 5000

For intermittent or light service . . . for fine or small lump materials. 14- to 30-in. belt widths. Equipped with commercial ball bearings.

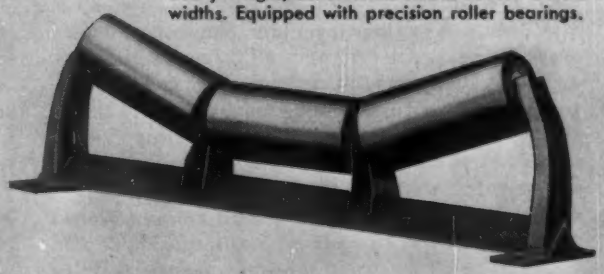
Write for new Catalog 2716 on Link-Belt's new, expanded line of belt conveyor idlers.

SERIES 6000

For intermittent operation, medium capacities, and for moderate weight, semi-abrasive materials—or for continuous operation handling lightweight, fine material. 14- to 48-in. belt widths. Available with greaseable or factory-sealed precision type ball bearings.

SERIES 7000

For continuous operation . . . high capacities . . . heavy-weight, abrasive materials. 18- to 48-in. belt widths. Equipped with precision roller bearings.



complete belt conveyor idler line — now

BROADER! EVEN BETTER!

YES, Link-Belt's comprehensive line of belt conveyor idlers is now even *more* complete. Expansion to over *630* types and sizes in *5* new series permits selection of an idler that exactly matches the job. And design improvements have created manufacturing efficiencies that contribute to our ability to offer a quality line without added cost or price premiums.

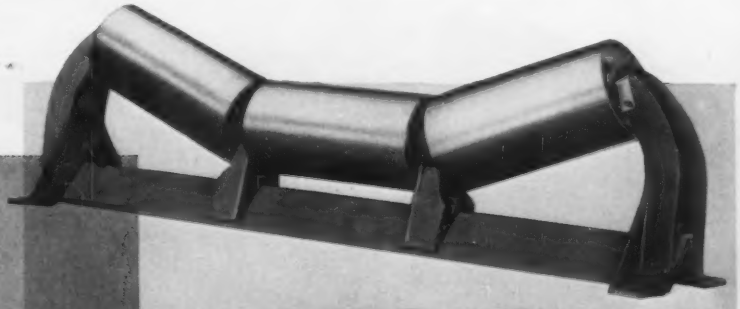
Ranging in application from light or intermittent service to continuous heavy-duty operation, Link-Belt idlers are made in both 20° and 45° troughing for a broad range of belt widths—with rolls of various diameters, materials and coatings. This broad coverage avoids wasteful over- and under-engineering . . . permits "pin-pointing" that results in substantial savings in purchasing and maintenance.

For further facts on this new, expanded line—contact your nearby Link-Belt office or stock-carrying distributor. Look under CONVEYORS in the yellow pages of your phone book.

LINK-BELT

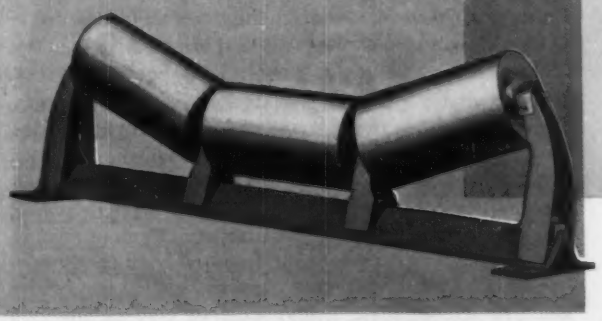
BELT CONVEYOR IDLERS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 14,985



SERIES 8000

For continuous operation . . . higher capacities . . . heavier-weight, abrasive materials. 24- to 60-in. belt widths. Equipped with precision roller bearings.



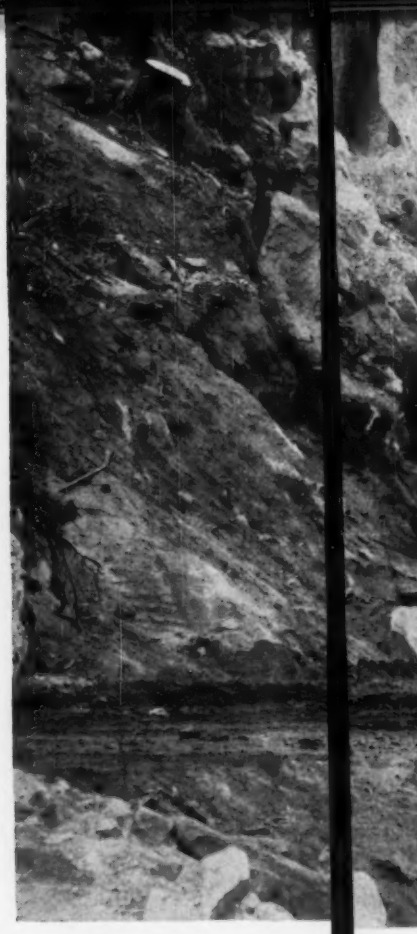
SERIES 9000

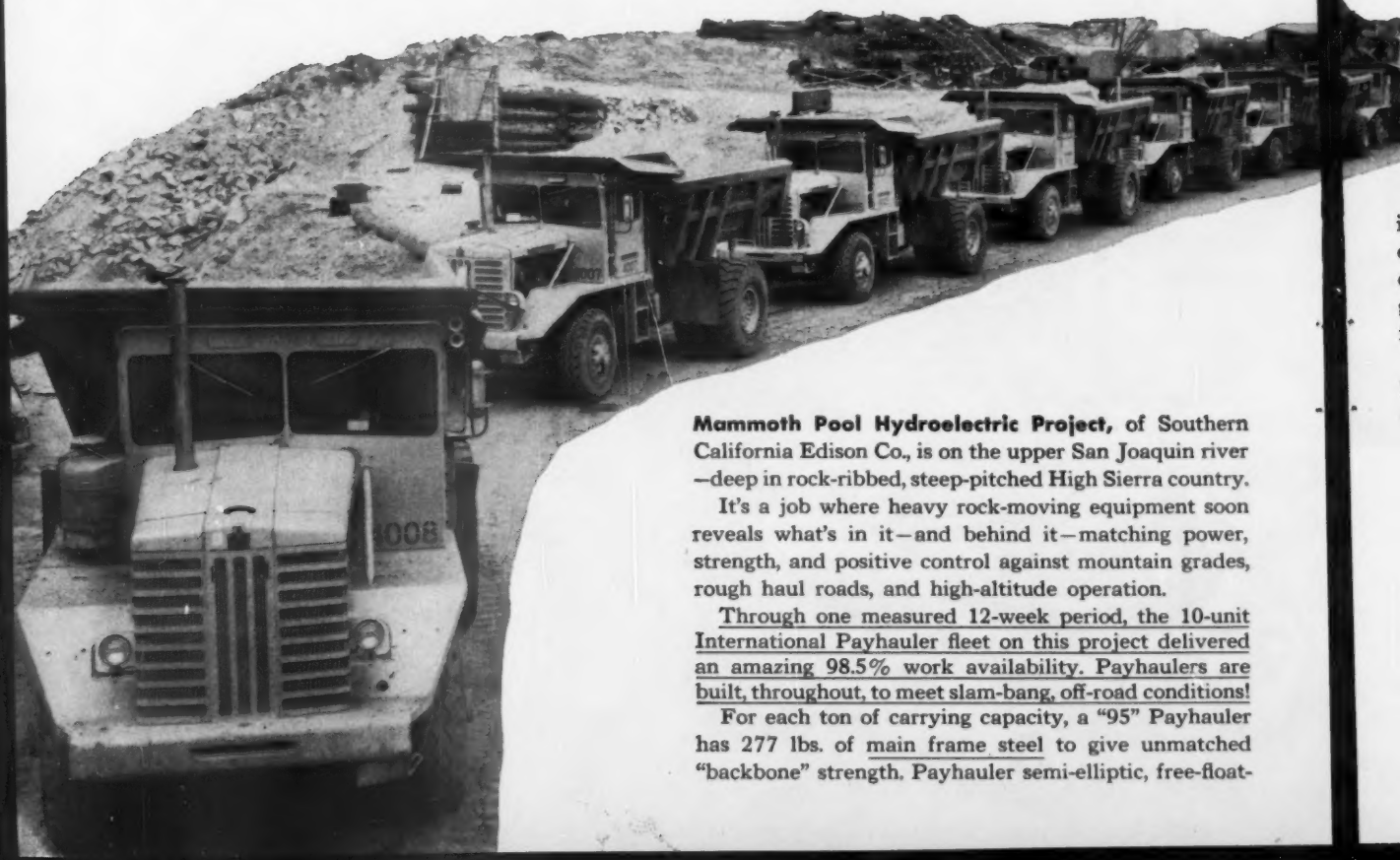
For continuous service . . . highest capacities . . . heaviest and coarsest materials. 36- to 84-in. belt widths. Equipped with heavy-duty precision roller bearings.

"95" Payhauler® fleet delivers 98.5% availability

highballing rock loads over High Sierra grades

FOR SOUTHERN CALIFORNIA EDISON CO., LOS ANGELES



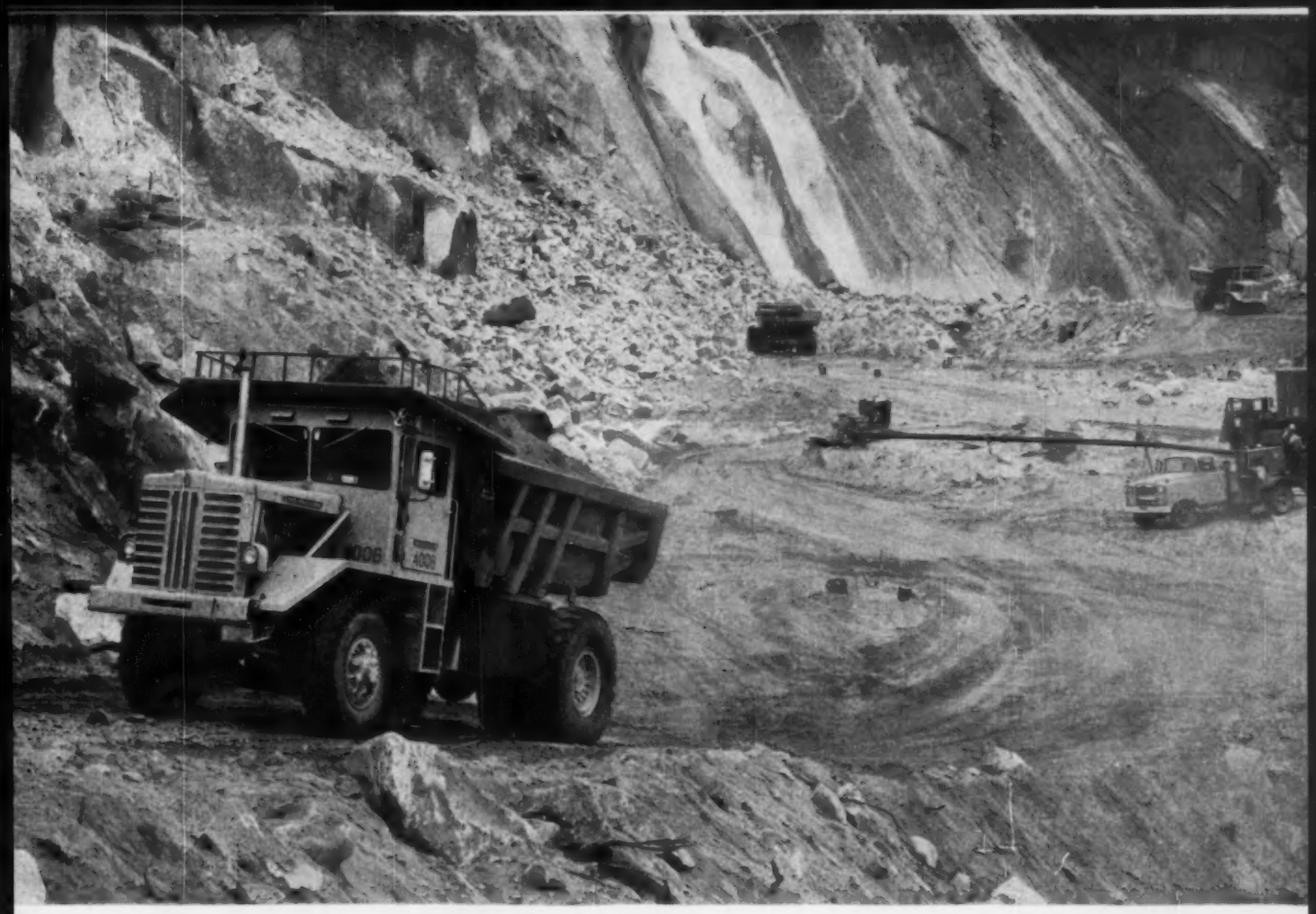


Mammoth Pool Hydroelectric Project, of Southern California Edison Co., is on the upper San Joaquin river —deep in rock-ribbed, steep-pitched High Sierra country.

It's a job where heavy rock-moving equipment soon reveals what's in it—and behind it—matching power, strength, and positive control against mountain grades, rough haul roads, and high-altitude operation.

Through one measured 12-week period, the 10-unit International Payhauler fleet on this project delivered an amazing 98.5% work availability. Payhaulers are built, throughout, to meet slam-bang, off-road conditions!

For each ton of carrying capacity, a "95" Payhauler has 277 lbs. of main frame steel to give unmatched "backbone" strength. Payhauler semi-elliptic, free-float-



"95" Payhaulers are "horsing" their 24-ton rock loads up grades as steep as 18%—on the Mammoth Pool Project! The "95's" Turbo-charged diesel engine develops 335 hp—the 18-ton "65's" is 250 hp!

Here's part of the 10-unit "95" Payhauler fleet parked during noon-hour, that established the amazing 98.5% availability record on Southern California Edison's Mammoth Pool Project!

Two rock-loaded "95's" are on their way—while a third one spots its big-target body for the shovel. Five International Planet-Power steered TD-24's and 12 UD-6 International power units on generators also help make this $50 million job roll!

ing springs gain extra shock-swallowing support from extra leaves and extra length. Payhauler speeds match every load and road. And Payhauler exclusive integrally-forged full-floating planetary drive axles take full-torque loads without over-stress.

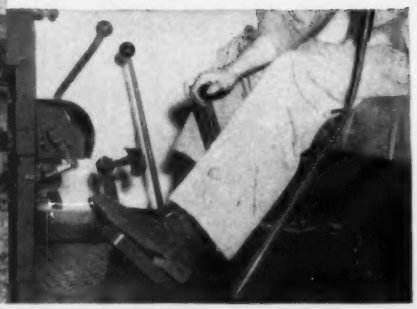
This extra built-in stamina helps International Payhaulers establish standout availability records. And so does ready availability of parts and service from your International Construction Equipment Distributor's well-stocked bin and well-manned shop—backed by factory warehouse parts reserves.

See how a Payhauler's bonus of Turbo-Charged diesel power assures you fuel-thrifty, big-load performance—even at high altitudes. Watch how power on Payhauler rear wheels helps deliver top operating efficiency on steep grades or mucky conditions—even where trailer-type units "spin their wheels." Prove that Torqmatic braking safely and positively controls the fully-loaded "95" downgrade—with little or no foot-brake help! See your International Construction Equipment Distributor for a demonstration!

International® Construction Equipment

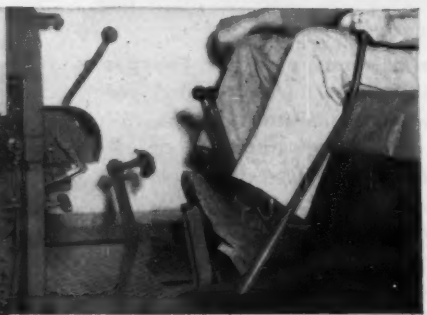
International Harvester Co., 180 North Michigan Avenue

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors . . . Self-Propelled Scrapers . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Haulers . . . Diesel and Carbureted Engines . . . Motor Trucks . . . Farm Tractors and Equipment.



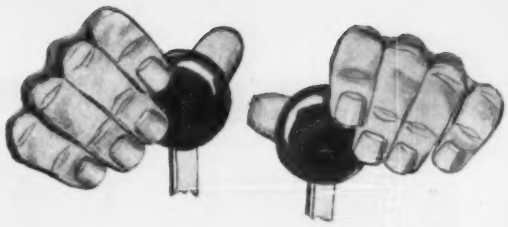
FEATHER-TOUCH CONTACT

As the TD-24 pusher approaches the Payscraper, operator slows tractor speed *with one hand* by power-shifting planetary system; and by depressing the foot decelerator. He gets feather-touch contact without declutching, brake-riding, or throttle change!



HIGHER REVERSE

Operator uses decelerator pedal to slow engine at end of pusher run, permitting faster reverse shifting. Fast reverse speeds, coupled with power-shifted planetary steering system, allows TD-24 operators to reposition pusher extra fast and reduce scraper pick-up time.

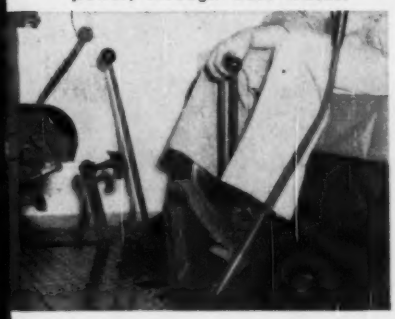


Your operators have fingertip control of greater push-loading profits because...

PLANET-POWERED "24's" beat other rigs on all four steps of the push cycle!

"CONSTANT CONTACT" LOADING

Releasing foot decelerator instantly applies full power, for efficient loading. Power-shifting either track into high range maintains solid pusher contact on curves—applies TD-24's full power, through both tracks!



GEAR HIGHER KICK-OUTS

Once scraper is fully loaded, the TD-24 *follows through* as operator power-shifts on-the-go with one hand to higher gear range, boosting speed of both units 27%. This allows most scrapers to come out of the cut a gear higher.

Your push-loading profits are in your operator's hands. And your operators know they can load out more scrapers every shift when their hands control the boss of the borrow pit—the International TD-24 crawler. The four-step pusher cycle (shown) pinpoints reasons why your operators and TD-24 pushers can increase production with easier control—from contact through kick-out.

Only the TD-24 gives you this big difference in pushers: more productive effort at the fingertip command of your operators! Exclusive Planet Power steering lets your operator: 1) keep pusher speed matched to that of the scraper; 2) power shift either or both tracks up or down a full speed range with a mere flick of the finger; and 3) apply full power to both tracks even if scraper cut is made on a curve.

And your TD-24 operators can fully utilize the decelerator pedal to cut maintenance costs three ways. The decelerator reduces engine clutching; eliminates brake pedal riding for steering; and permits feather-touch scraper contact without slam-bang jarring of operators and machines.

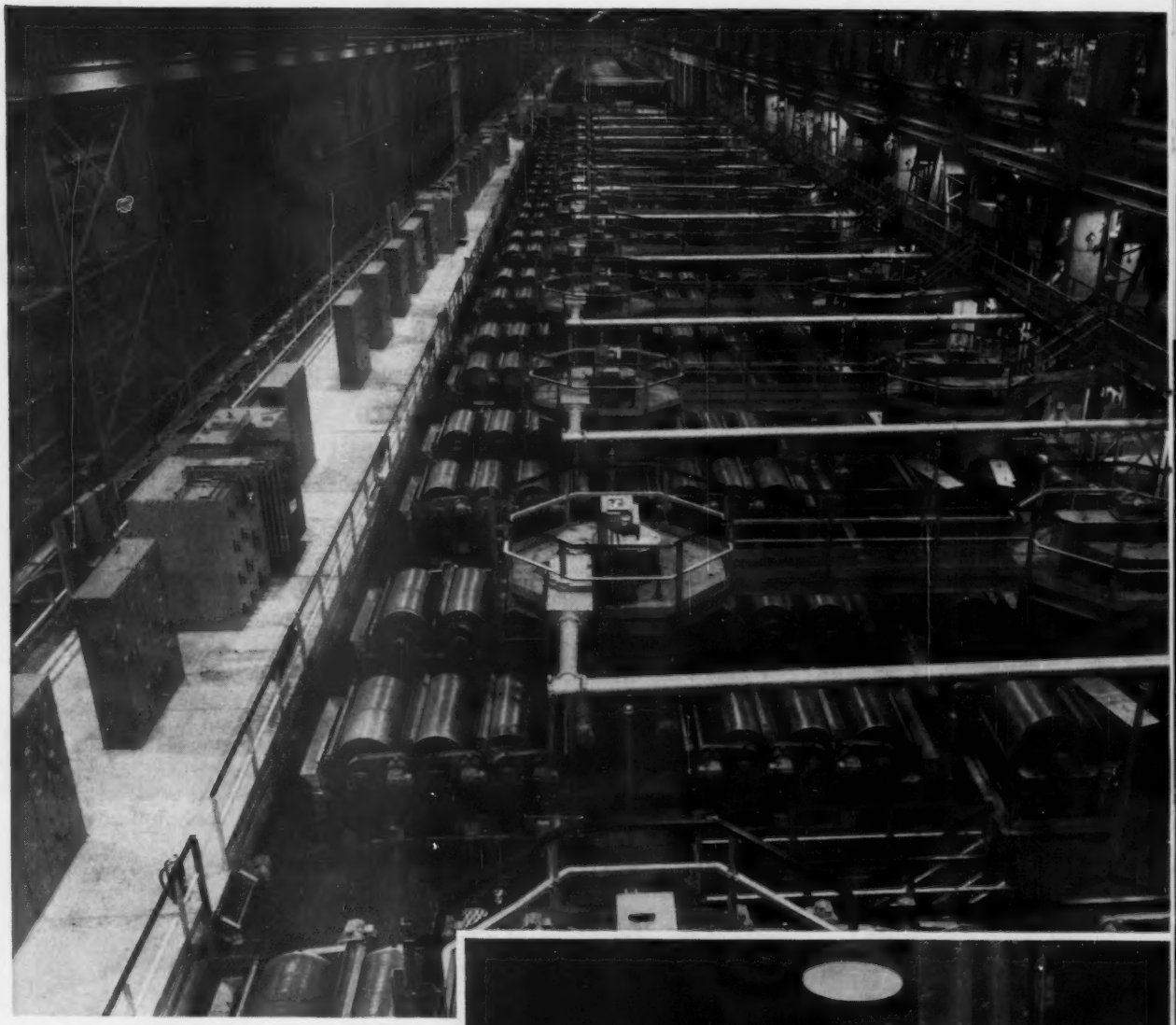
Get all of these TD-24 features that cut the cost of loading out paydirt, with either a Torque Converter or gear-drive tractor best suited to your needs.

If you're a dirtmover, get the TD-24 stay-on-the-job story by checking with any of the thousands of owners. Ask about the comparative life of such important components as track rollers and rails, engine, transmission, and planetary steering system. Get a TD-24 on your job today by calling your International Construction Equipment Distributor for a demonstration. Then you'll see how the TD-24 earned the right to be called "Boss of the Borrow Pit."

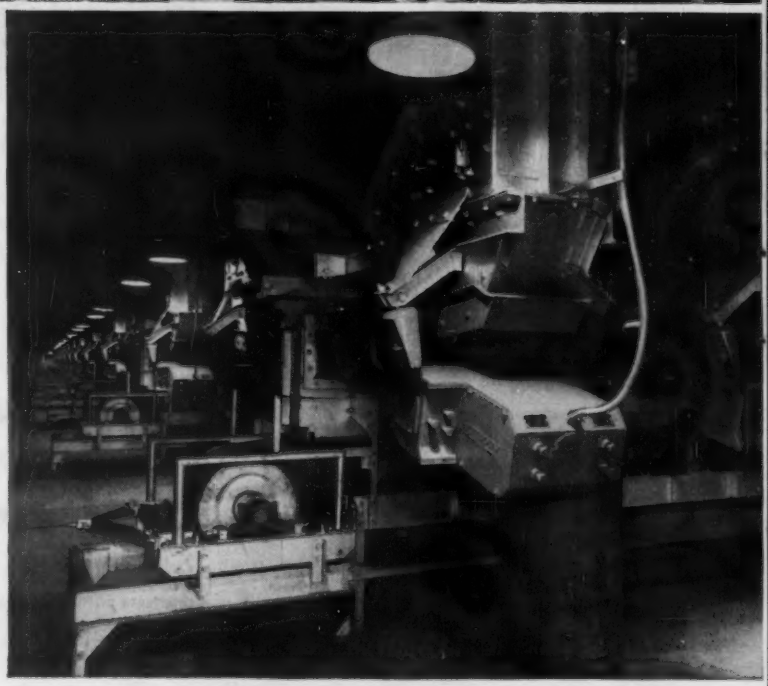
International® *Construction Equipment*

International Harvester Co., 180 North Michigan Avenue

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors . . . Self-Propelled Scrapers . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Haulers . . . Diesel and Carbureted Engines . . . Motor Trucks . . . Farm Tractors and Equipment.



A quarter mile lineup of Jeffrey Magnetic Separators are used in concentrator operations... 108 single-drum ball mill cobbers were designed to remove about 18% tailings ... 108 three-drum finishing separators, about 14% tailings.



324 Jeffrey Vibrating Feeders move ore to rod mills. There are 12 feeders to a processing line... but in an emergency, 3 of these Jeffrey feeders will handle the 100 ton per hour flow to each of the 27 lines.

New Taconite Plant sets 24-hour, year-round pace

Magnetic separators help raise iron content of pellets to 64%

... Jeffrey feeders keep ore on the move

ONCE, there was plenty of high grade ore for the nation's blast furnaces. Now, taconite—a hard rock which assays only about 30% iron—is being used to help meet the demand for more and more products of steel. Iron yield of the Mesabi Range is being greatly extended by a new plant which can, *every day*, turn about 63,000 long tons of taconite ore into approximately 20,000 tons of pellets bearing up to 64% iron. And efficient, trouble-free Jeffrey equipment is an important part of the vast and highly mechanized operation necessary to make this processing economically practical.

Jeffrey Vibrating Feeders—48 heavy duty 5DTS units feed coarse ore from surge bins to cone crushers and screens. 324 Type 4DTH units feed fine ore to rod mills. 48 Type 4DTS feeders handle hot pellets as they are discharged from furnaces. Balanced vibration assures quiet operation, definite control, easier installation, low operating and maintenance costs.

Jeffrey Magnetic Separators—216 ball mill roughers and finishing separators are used in concentrator operations. After proper settings are made, feed may vary from zero to maximum capacity without need for further adjustment. Jeffrey separators are furnished in both permanent and electro types.

In all types of mining and processing of solids carefully engineered, precision built Jeffrey machinery and components provide long, dependable service. For complete details, write for Catalog 910. The Jeffrey Manufacturing Company, 974 North Fourth Street, Columbus 16, Ohio.

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METALKASE XXP and XP

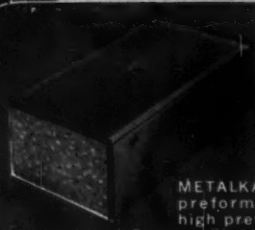
Steel Encased and Internally Plated Basic Brick Provide

- **greater spalling resistance**
- **reduced peeling tendency**

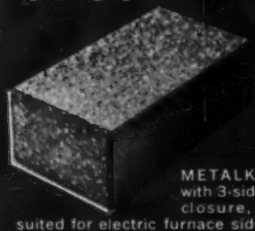
METALKASE XXP are chemically bonded basic brick with two internal plates, formed under high pressure, and are furnished in standard sizes, suspended arch and other shapes. They are available in various compositions. In the illustration the METALKASE XXP brick is cut to show the plated construction. These plates extend through the length of the brick.

METALKASE XP brick, having a single internal plate, are made in hard fired basic brick of various classes. They are available in standard sizes and many special shapes. These brick are used in various particular applications with great benefit.

Extensive use in both steel and various non-ferrous metallurgical furnaces clearly demonstrates the superior spalling resistance of the internally plated brick, and as the result of improved stress relief, appreciably reduced tendency to peel.



METALKASE brick, preformed under high pressure and encased on all four contact sides by welding, in 22 gauge steel.



METALKASE brick with 3-sided steel enclosure, especially suited for electric furnace side walls and other specific applications.

Other Metalkase designs

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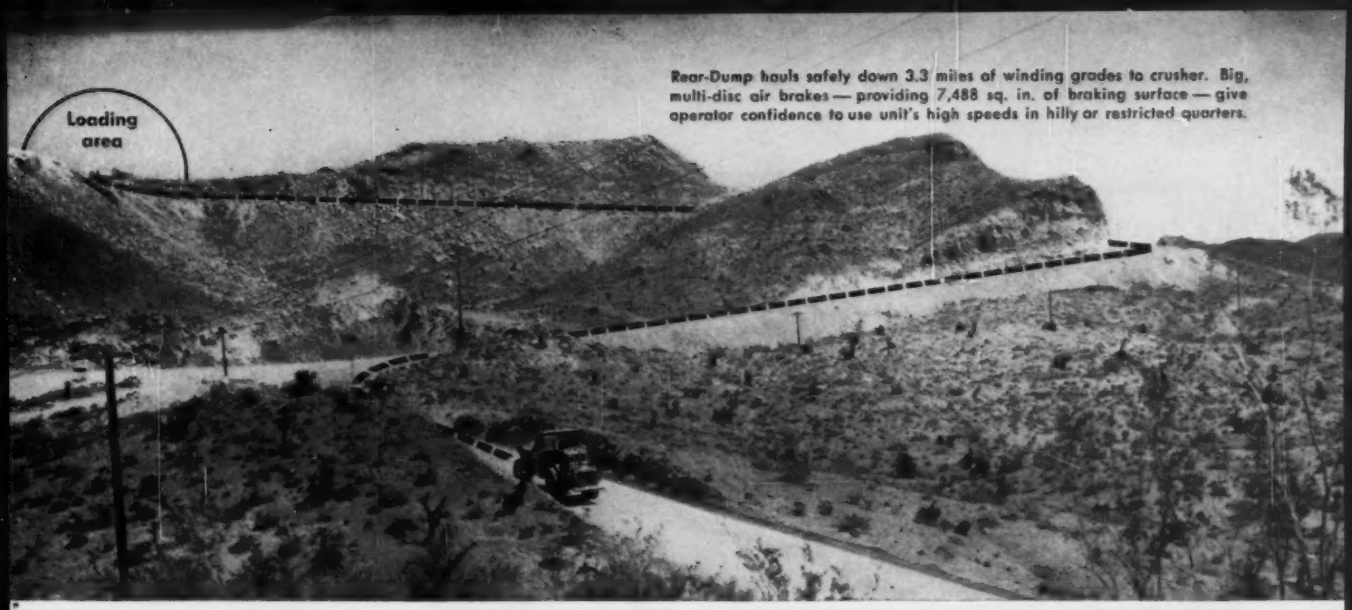


Rear-Dump hauls safely down 3.3 miles of winding grades to crusher. Big, multi-disc air brakes — providing 7,488 sq. in. of braking surface — give operator confidence to use unit's high speeds in hilly or restricted quarters.

On 6.6-mile cycle . . .

two 35-ton haulers move 2,352 tons limestone daily

A large California cement plant produces 5 million barrels of cement a year. To meet today's stepped-up demands, the company is mining limestone at several pits at Oro Grande — 24 hrs. a day, 5 days a week. Important tools in their hauling fleet are two LeTourneau-Westinghouse 35-ton B Tournapull® Rear-Dumps. Here's how these high-production units perform:

Haul up and down average 3 to 4% grades

35-ton B Rear-Dumps are loaded to heaped capacity by a 2½-yd. shovel. Units then haul material 3½ miles to crushing plant. On the haul, Tournapulls travel up 4% grade for 1/5 mile, and then over an average 3 to 4% down-grade for 3⅓ miles. Despite waiting time at shovel and plant hopper, company records show the two Rear-Dumps average 98 tons (2.8 loads) per hour. At this rate, units haul 784 tons per 8-hr. shift . . . or 2,352 tons daily.

"Maneuverable, easy to maintain"

Quarry Superintendent commented, "I like the 'B's' . . . they're maneuverable and easy to maintain. And on steep downhill hauls we have to have their sure, safe brakes." Added one of the operators, "The B Rear-Dump is easy to control. We do our own lube and it takes me only 5 minutes per machine."

Use rubber-tired tractor for clean-up

The company uses another LeTourneau-Westinghouse tool to speed pit operations. It is a high-speed 210 hp Tournatractor®. This rubber-tired tractor shuttles around the multiple pit operations fast — cleans up around shovels and blast area, and maintains haul roads. On blast clean-up, Tournatractor completes the job in ⅓ the time it used to take with a crawler tractor.

Cut operating costs

Any pit operation shows more production . . . more profit . . . when it has modern high-speed equipment in its fleet. Why not arrange for a demonstration of LeTourneau-Westinghouse Rear-Dump, and/or Tournatractor? Call or write for complete details. No obligation.

BRCT-1540-QMJ-1

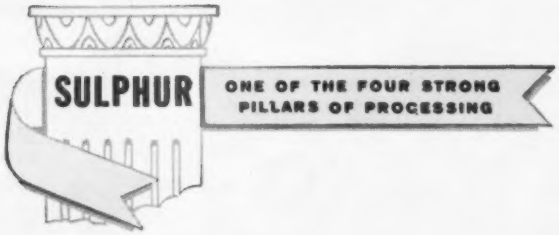
Big B Rear-Dump empties 35-ton load of limestone into hopper. Electric hoist motor — operated by electric switch on dashboard—lifts bowl at any desired angle for slow, precision feeding.

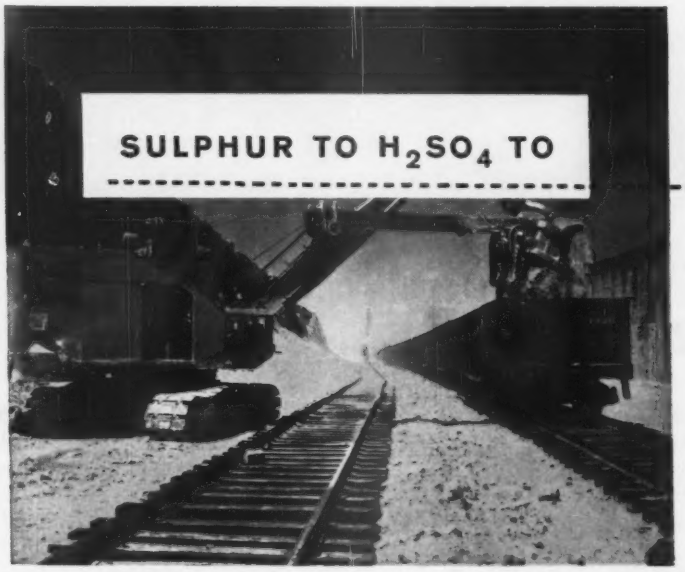
Tournatractor cleans up around 2½-yd. electric-power shovel at California limestone pit. Rubber-tired tractor drives job-to-job fast — crosses air-drill hoses, electric cables, railroad tracks, pavement, without damage. Operator says: "Tournatractor is fast . . . beats a crawler to keep pits and haul roads clean."

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit





29% Fertilizer
(Superphosphate; ammonium sulphate)
21% Chemicals
9% Petroleum
7% Paint & Pigment
5% Steel
4% Rayon
2% Others

Tinker to Evers to Chance . . . Those of us with gray hair remember well that sure-fire, double play combination of the old Chicago Cubs.

Sulphur, too, is playing the major role in many an industrial 'double play'. With Sulphuric Acid as the keystone derivative, Sulphur is serving six major processing industries with big tonnages and countless others requiring smaller tonnages.

In this connection, the following statistics may be of interest:

The sulphuric acid industry consumes 82% of all elemental sulphur and its equivalent produced in the States. Of this 82%, about two-thirds comes from Frasch Process Sulphur and from the treatment of natural sour gas. The balance is from pyrite, roaster gases, recycling of spent acids, etc.

Texas Gulf, the leading producer of Frasch mined and sour gas Sulphur, has always been and will continue to be industry's reliable source of supply. Recently, a new mine in Texas came into production. Other developments both in mining and sour gas-treatment are nearing completion. To broaden its service to users of Sulphur, Texas Gulf recently inaugurated shipments of molten Sulphur. Distribution centers are being set up.

To be a leader in industry, a company must give service and develop in anticipation of needs. This role, Texas Gulf Sulphur will continue to play to the best of its resources and ability.

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How self-powered scrapers help cut mine operating costs

Tournapulls may be self-loaded, push-loaded, or shovel-loaded. The 9-yard "D" shown here hauls at speeds to 29.5 mph, unloads in seconds, makes complete turn in 26 feet. Simple electric controls and big 4-wheel air brakes permit rig to work safely at high speeds in tightly restricted quarters.

Read the following list of mine-scraper applications . . . analyze these scraper economies for your open pits:

1 In auxiliary stripping, where overburden is so thick that the wash or earth must be removed to allow boom-type equipment to work within its economical limits.

2 Where spoil room for boom-tool operations is inadequate; where outcrop is bothered by property lines, highways, railroads, pipe lines, power lines and undivertable streams.

Rigs make 180° turns, in less than machine's length, operate in tight quarters as shown above. Tournapulls keep working in tough going when other self-powered scrapers bog down. When one wheel slips, exclusive power-transfer differential automatically transfers power to wheel on firmest footing. Positive geared steer on kingpin pivots prime-mover from side to side, "walking" drive wheels to fresh footing.

3 Widening a bench at the side of the pit to provide greater casting area for shovel or dragline.

4 Stripping wet top-layers of earth, which might slough and cause slides into a shovel cut.

5 Cutting the initial box-cut, depositing the spoil out-of-the-way of later dragline operations.

6 Stripping or mining small or isolated veins that do not warrant the expense of moving large excavating equipment to the site.

7 Stripping hillside and hilltop operations...self-powered scrapers particularly adapted for this type of work.

8 Cutting new beds for temporary or permanent stream diversions; building dams and settling ponds.

9 Building grades for railroads and for truck haul-roads.

10 Construction and maintenance of ditch and drainage systems.

11 Grading around mine buildings and mine location housing.

12 Land-fill disposal of refuse.

13 Stockpiling of coal . . . spreads in even layers, compacts while hauling.

14 Supplementary hauling of ore, coal, or overburden...open-top scraper can be shovel-loaded and used as a truck-type hauler.

15 Mining lean ore, previously abandoned, in widely scattered or isolated areas.

16 Stripping overburden where level piling of spoil is required.

17 Stripping shallow overburden which does not justify expense of installing and operating major excavating equipment.

18 Leveling spoil piles for drainage, reforestation, farming, etc.

19 Removing and replacing top-soil for reclamation purposes.

If you have any of the above dirt-moving problems . . . write us or check with your nearest LeTourneau-Westinghouse Distributor. We'll be glad to have our experienced field engineers analyze your operation and propose suitable procedure and equipment for most economical handling. Our rubber-tired prime-mover scraper combinations are available in three sizes: "D" . . . 138 hp . . . 9 yards heaped capacity; "C" . . . 210 hp . . . 18 yards heaped capacity; BIG "B" . . . 335 hp . . . 28 yards heaped.

Tournapull—Trademark Reg. U.S. Pat. Off. P-1508-M-1

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

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Where quality is a habit

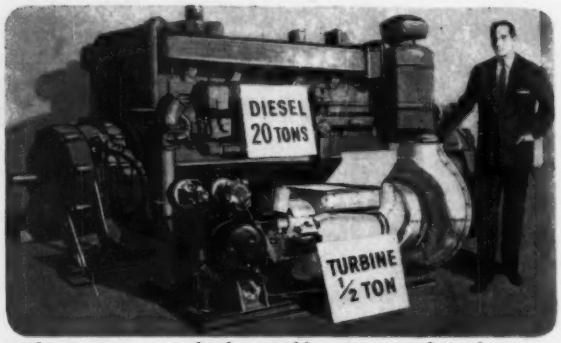
Four amazing advantages of Solar Gas Turbine Engines

Gasoline—any kind.

Diesel oil

Kerosene.

Natural gas.



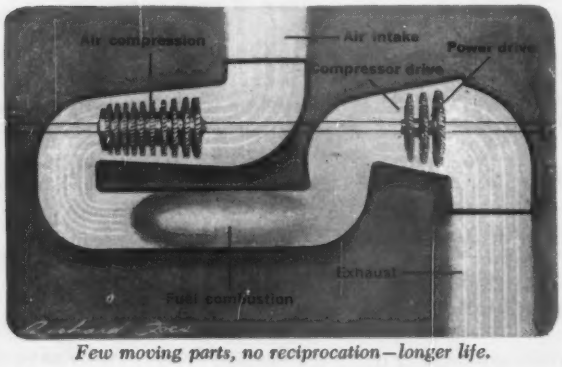
The Jupiter is completely portable—saves weight and space.

❶ Uses whatever fuel you've got!

Solar gas turbines can operate on almost any available fuel—fuel that costs the least for *your* particular operation. Located in remote areas, for instance, self-sufficient Solar turbines can take fuel directly from a gas pipeline! This often results in lower total operating costs.

❷ Light—500 hp in 1/5 the space!

Solar's 500 hp Jupiter® engine is only one-fifth the size of a diesel of similar horsepower—and weighs *forty times less!* The entire unit is easily transported to remote locations. And it is especially suited to applications where space limitations create a troublesome installation problem.



Few moving parts, no reciprocation—longer life.

Instant acceleration—takes full load without laboring.

Instant emergency power.

Starts in any climate.

❸ Simple design—low maintenance!

Gas turbines are the simplest of all heat engines. In operation, large volumes of air are drawn in by the compressor, mixed with fuel in the combustion chamber, greatly expanded, and delivered to a turbine which produces shaft power. Routine servicing can be completed in a few hours at most. Overhauls are infrequent. Simple design and low maintenance make gas turbines ideal for a wide range of important applications—including boat propulsion, portable power generation, air compression and chemical processing. And other applications for these versatile power plants of the future are limited only by the imagination.

❹ Starts instantly—no warm-up!

Solar gas turbines can be turned on or shut down in seconds. And they require no warm-up—even after long periods of stand-by service. No matter what your business, no matter what your power needs, these amazing advantages can benefit you. Write to Dept. F-86 for free gas turbine brochure.

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"BLUE RIBBON" PRODUCT
This is the Coppus VANO. The propeller-type, best for shorter pipe lines, medium pressures.
This is the Coppus VENTAIR. A centrifugal blower, it is designed for long pipe lines, high pressures.

These are the cost-reducing Blowers that give up to 100% more air

Only Coppus makes both types — and both are made especially for *mine* ventilation. One or the other, operating under the conditions for which it is designed, delivers from 30% to 100% more air for a given power consumption than an ordinary all-purpose fan.

They can be used as blowers or exhausters and are driven either by compressed air or electric motor, with capacities up to 90,000 CFM. Like all Coppus products, these blowers wear the "Blue Ribbon" that stands for high achievement in engineering, workmanship and performance.

for special purposes. See also THOMAS' REGISTER . . .
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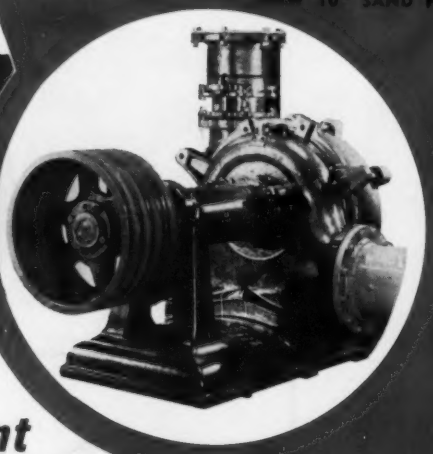
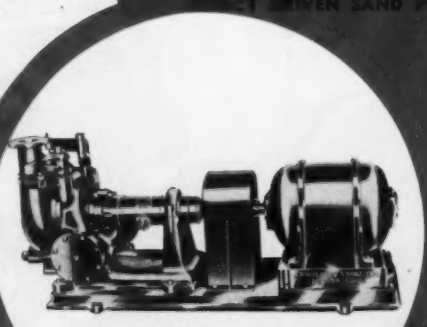
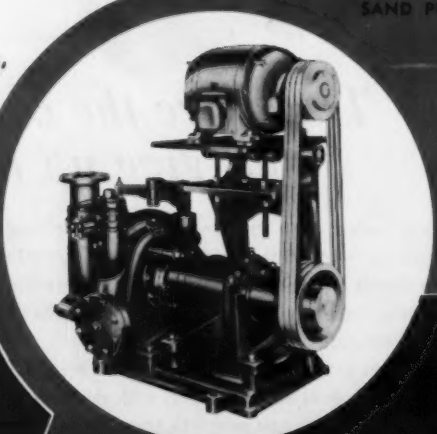


Belt driven, overhead V-belt driven and direct driven Wilfley Model "K" pumps are available in 1" to 10" discharge sizes with capacities from 10 to 4000 GPM. These famous pumps may be fitted with **interchangeable** wear parts of electric furnace alloy white iron, Ni-Hard type metal, special application alloys, or rubber-covered. Write or wire for complete details.



To give you **maximum economy in solids** pumping every Wilfley installation is **job engineered.**

Specify Wilfley Sand Pumps for Maintained High Efficiency, Low Maintenance Costs, Continuous, Trouble-Free Operation, Long Pump Life and Quick, Easy Replacement of Parts.



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ENGINEERING AND MINING JOURNAL

NOVEMBER 1958

How Modernization Benefits The Mine and the Man

FROM A BUSINESSMAN'S point of view, it's obvious that the objectives of a good modernization program should be to increase productivity, cut costs and maintain a good profit margin.

The special report by the McGraw-Hill Economics Department, which follows on p 89, points up the economic advantages and necessity of an over-all industry modernization program.

One added aspect of modernization became astonishingly clear as we interviewed prominent mine plant designers, equipment manufacturers, mining and metallurgical engineers and industrial engineers, to obtain information and ideas for this issue. It's this —if we make mines and mineral processing plants better, safer, cleaner, more comfortable, less arduous for the man, we automatically achieve the economic benefits mentioned above.

For instance, several years ago Johns-Manville concluded that if the cabs of earthmoving equipment such as tractors, shovels and trucks could be made more comfortable for the operators, the required investment for the conversion of the cabs would cut fatigue and discomfort, and enable the operators to perform more efficiently. See *E&MJ*, May 1956, pp. 92-95. The conversion was made at a cost of many thousands of dollars, and the company found that the cost was justified.

Manufacturers, too, have improved equipment design to achieve these ends. At the recent Mining Congress Equipment Show in San Francisco it was evident that trucks and earthmoving units are getting larger—50, 70, and even 100 tons. See p 136. But if you had climbed up one of the stairways leading to the cab of a 70-ton model, you would have seen a comfortable cab, with foam-rubber seats, green glass windows to prevent glare and eyestrain, provisions for air conditioning or ventilation, and finger-tip controls which enable the operator to maneuver the huge earthmoving unit effortlessly and with precision. It's safe to say that a single man can now move 50 to 70-ton loads with considerably less effort and fatigue, than could the driver of an old 10 or 15-ton model. Power steering, air starters, and power brakes in new models are but a few of the mechanical features that increase productivity and safety at the mine.

From a safety standpoint, it is evident that mine operators are going to attack the number one killer of men in mines—fall of rock—with greater ingenuity and vigor. The recent introduction of roof bolts, roof-sewing and stabilization devices, new concretes and cements, yieldable arches, and yieldable mine props indicates this trend. Ground stabilization by pumping the tailings back into the mine is also being accented in mine operations. Coupled with such new developments as flocculants and cyclones to condition and dewater the backfill, mines are experiencing two benefits—safer ground conditions for the miner and elimination of tailings which constitute an objectionable pollution hazard in some areas.

Speaking of pollution control, the articles which follow show that the mining industry is no longer soft-pedaling this issue, but on the contrary, taking positive steps to control dust and fume in mine plants. This move not only improves community relationships, but increases health standards and reduces compensable disability cases as well.

One of the pressures that is accelerating modernization is the high cost of labor. In every process in mines and metallurgical plants where the human hand has to exert effort, we see the introduction of mechanical devices to eliminate or minimize the effort. The back-breaking job of mounting heavy drifters on columns and crossbars has been outmoded by automatic jumbos which enable a single operator to position several heavy drills and operate them entirely with push-button or finger-tip controls. New long steels with hard-surface bits eliminate the frequent changing of steels. With mine labor at about $25 per day, it's obvious that investment in equipment which makes mining less arduous is also profitable.

Another result of high labor costs is the development of better transportation for the worker. Mine cages designed for transporting crews are moving away from the old drafty open construction to units resembling elevators in appearance and operation. The use of man-trip cars is steadily increasing.

The fact that mines are often situated in remote areas requires mine management to pay more than average attention to the living environment of the staff and other employees. The old concept of "a mine camp" is giving way to modern townsites which enable companies to attract high quality staffs and workers, and to cut down on high turn-over costs. See the El Salvador townsite plan, p 100, which incorporates many features that add to the well-being of the worker.

Modern Management Philosophy

A second development revealed in a survey of modernization in the mining industry is the trend of management to resort to industrial engineering to promote higher efficiency and production. A study of the progress made by industrial engineers in other fields shows that the mining industry can profit handsomely by adopting certain techniques of modern scientific management specified in industrial engineering handbooks as quality control, operations research,

automatic controls, methods control, standardization, etc.[1]

Automatic Controls. C. M. Marquardt, president of Industrial Physics and Electronics Co., observed that "more progress has been made in the application of instrumentation and control in the uranium milling industry in the last five years than in 50 years by the minerals industry in general."[2] Realization of this fact has prompted some companies to set up departments which are responsible for the conversion of manual control equipment to automatic controls and for the maintenance of the delicate instruments involved. In the New Products Digest, p 43 to 50, note the application of a nuclear density gage for measuring slurries in pipelines, and to control solids in bins or reactors. Another unit mentioned is designed for the continuous measurement of chemical reactions in a process. The unit also can maintain continuous control over the process. Elaborate control systems are installed in taconite and other iron ore beneficiation plants. See Jones & Laughlin's 2,500-ton-per-day sintering plant, p 111.

Operations Research. In an article "Operations Research and the Mine of Tomorrow," Tom Ware, president of International Minerals & Chemical Corp., explained how this concept of scientific management has been used to solve a dragline problem, and how it enabled management to make a vital decision pertaining to selection of a flowsheet.[3] He summed up the importance of this technique as follows, "Operations Research is part of the engineering frontier. Management will welcome it as a vital part of planning and decision-making in the mine of the future."

Solution of the complex dragline problem was hastened through use of the "Whirlwind," a computing machine which made calculations that normally would have required more than 300 man-years of work. The time has arrived when mine researchers can solve problems which they would have avoided formerly because of the prohibitive time element involved in the calculations. Remington Rand has published a booklet showing how the Univac can speed up earthwork computations tenfold. Other computing machine manufacturers will cooperate with mining companies in setting up procedures to simplify and speed up calculation of engineering problems.

Quality Control. A thorough understanding of this phase of industrial engineering could conceivably produce some startling changes in mine management. For instance, if a thorough study were made of an integrated mine, mill and smelter operation, the application of quality control methods might dictate the mining of different grades of ore (not necessarily the lowest-cost grade) to effect more economical recovery in the mill. Along these same lines management might find that milling methods might have to be revised (even though more costly) to produce concentrates which would effect a lower smelting cost. Under a quality control system the whole range of mine products and costs would have to be equated against a corresponding range of mill recoveries, which in turn would have to be equated against smelter costs and recoveries.

Quality control studies will also enable a metallurgist to improve efficiency and recovery in plants by a scientific analysis of certain routine mill records.

Replacement of Equipment. Industrial engineers have worked out formulas and systems which will enable management to determine when to replace inefficient or outmoded equipment. The METRE method (Most Economical Time to Replace Equipment) developed by the Caterpillar Tractor Co., and the MAPI formula, developed by the Machinery and Allied Products Institute are referred to on pp 102 and 103.

Cost Control. A good cost control system is intended to be more than a bookkeeping procedure. It is designed to point the way to improved operating techniques by revealing the flaws in an existing mining or metallurgical process. Certain criteria or standards must be set up. The yardstick to be used for comparison and improvement of processes depends upon measurement of the following: material yield or production, direct labor, indirect labor and expenses, overhead, administrative and marketing costs.

Plant Layout. In some manufacturing plants, certain industrial engineers devote their full time to plant layout. This does not refer merely to an orderly arrangement of equipment in a building, but rather to a scientific arrangement of work areas and equipment that will be the most economical to operate and yet safe and convenient for the employees. Objectives of a good plant layout are smooth flow-through of work, effective use of space, minimum distance in the flowsheet and provision for expansion or revision of the plant. The principles of scientific plant layout can be applied to a single shop such as a timber-framing shop, a steel-sharpening and bit shop or an equipment maintenance shop.

On a larger scale, plant layout engineering may be applied to the arrangement of a series of crushing plants, storage units and a concentrator. Objectives for the large El Salvador mineral processing plant in Chile are explained and illustrated on pp 98 and 99. Compactness, orderly right-angle arrangement of buildings, and provision for modification or expansion of the flowsheet are outstanding features in the plant layout.

Methods-Time Measurement. This industrial engineering function analyzes any manual operation or method into basic motions and establishes and studies time requirements with a view toward improving old methods, introducing new methods, establishing time standards for wage-rate negotiations, training operators and estimating costs. Studies of this type have been carried to a minute degree in manufacturing plants where operations are repeated frequently, and any improvements in methods are reflected in lower costs of manufacture. It is thought that similar studies could be made of operations in mining and mineral processing with similar benefits. This technique is not entirely foreign to the mining industry where time studies have been made to speed up mining cycles in shafts, tunnels and stopes.

Maintenance Control. The establishment of more elaborate maintenance departments and facilities in mines and the increasing acceptance of such new techniques as preventive maintenance, plus the detailed records of maintenance costs now in evidence in many mines indicates that management has adopted this phase of industrial engineering extensively.

Materials handling. This is not a new concept for mining men, to be sure. But it is equally true that if industrial engineering techniques had been recognized in the mining industry, the introduction of fork-lift trucks, industrial trucks, mobile cranes, etc., which were adopted on a widespread basis in the late Forties, would have gained acceptance at least a decade earlier because other industries were using materials handling devices that much earlier. This raises the question: How many other industrial advances are we missing in mining today?

[1] *Industrial Engineering Handbook*, H. B. Maynard, Editor-in-Chief, McGraw-Hill Book Co., New York, 1956.

[2] "Instrumentation and Controls in Uranium Mills", C. M. Marquardt, *Mining Engineering*, September 1958.

[3] *Engineering & Mining Journal*, August 1955, pp 75-83.

PLAN '59

How Modern Is American Industry?

A Report by the McGraw-Hill Department of Economics

THE U.S.A. is starting a new period of economic growth, as we leave behind the recession of 1958. This new period presents a challenge to the nation, to the business community and above all to the individual company – to grow *at a profit*.

By now it is clear that growth is the normal way of life for the U.S. Economy. Since 1947, our national product has been growing at a rate of 3.7% a year. And no recession, even the latest and most publicized, has interrupted the trend for long. Now the economy is growing again.

But the conditions of growth are far different from those that prevailed in the years 1947 to 1957.

Today growth in the economy does not mean pressure on capacity, for most industrial firms. It does not mean easy profits. Rather, this is growth under highly competitive conditions, with profits dependent on a firm's ability to hold down costs. **Is our plant and equipment modern enough to do the job?**

A New Survey

To find the answers to this question, the McGraw-Hill Department of Economics has just completed a special survey of business needs for modernization. **The survey shows that it would cost $95 billion to replace today's obsolete equipment.** And this is a priority job, if business is to get costs down for the years ahead.

This tremendous need for modernization presents a challenge to the U.S.A. as a nation. The Communist powers are making a strong and disciplined effort to demonstrate that they can out-produce us – that they can "plow us under" in a contest of industrial strength.

It is a challenge to American business. Our people expect a continuously rising standard of living. Our workers expect wage increases. And often their demands mean price inflation – unless we can achieve sharp gains in output. The public demands higher national income without inflation. This is the challenge to business as a whole.

It is a challenge to the individual firm. Growth in the economy no longer means an automatic rise in sales and profits for any particular company. There are no shortages; industrial capacity is ample. So to participate in growth, the individual firm must achieve better quality or lower costs than its competitors. Otherwise, there will be no profit in growth and no success story for the company.

Is business prepared today for these challenges? The answer, from our study, is clearly "No". The production and distribution facilities of the U.S.A. are not efficient enough to ensure our continuing superiority over the Communist world, to match every wage increase with higher productivity, to do business in a competitive economy at satisfactory profit to the individual firm.

This statement sounds shocking at a time when much industrial capacity is idle and the recession just behind us is being blamed on a surplus of capital goods. But the facts speak for themselves. Here is the record on the past decade of investment in new plant and equipment, and here is our new study of the job that still remains to be done.

THE MODERNIZATION JOB AHEAD: $95 BILLION

The McGraw-Hill Department of Economics asked a wide sample of manufacturing companies, and experts in other industries, "What would be the cost to replace all obsolete facilities with the best new plant and equipment?" Here is a summary of the estimates. (Details on next page.)

MANUFACTURING AND MINING	$34.3 Billion
PETROLEUM INDUSTRY	5.3
TRANSPORTATION AND COMMUNICATIONS	18.4
ELECTRIC AND GAS UTILITIES	12.0
FINANCE, TRADE AND SERVICES	25.0
TOTAL: ALL BUSINESS	$95.0 Billion

Decade of Expansion[1]

Since 1947, private business in the U.S.A. has invested $291 billion in new plant and equipment. Our manufacturing capacity has increased about 80%; electric power capacity, 145%; capacity for basic raw mate-

[1] Figures on "Decade of Expansion" are for the years 1947-1957 inclusive, except where specific reference is made to preliminary data for 1958.

THE McGRAW-HILL SURVEY OF MODERNIZATION NEEDS

Conducted by the McGraw-Hill Department of Economics in August, 1958

INDUSTRY:	AGE OF MANUFACTURING CAPACITY Percent Installed: Prior to Dec. 1945	Dec. 1945 to Dec. 1950	Dec. 1950 to Dec. 1957	COST TO REPLACE OBSOLETE FACILITIES: Millions of $
Iron and Steel	47%	16%	37%	2,855
Nonferrous Metals	47	13	40	1,022
Machinery	41	21	38	3,224
Electrical Machinery	34	18	48	1,917
Autos, Trucks and Parts	42	11	47	2,204
Transportation Equipment (aircraft, ships, railroad equipment)	59	9	32	854
Other Metalworking	54	17	29	2,351
Chemicals	30	23	47	3,070
Paper and Pulp	49	17	34	2,655
Rubber	46	9	45	600
Stone, Clay and Glass	46	20	34	1,840
Petroleum Refining	45	26	29	1,499
Food and Beverages	58	19	23	3,443
Textiles	59	18	23	1,001
Misc. Manufacturing	51	21	28	6,236
ALL MANUFACTURING[1]	48	19	33	34,771

[1] Includes petroleum refinery companies listed under "petroleum industry" in previous table.

rials, by 55%. The distribution and service industries have increased floor space by roughly 50% in the decade. In 1957 alone, business spent $37 billion on new plants and equipment – more than the combined expenditure in all of Western Europe plus Canada.

But all of this expenditure has not made our facilities as modern as supposed, or as modern as we need. Of the $291 billion invested by business since 1947, roughly $157 billion has been for expansion of capacity. Only $134 billion has been spent to replace old facilities with better, more modern equipment. And in recent years, this investment has not purchased as much new equipment as the dollar figures suggest, because prices of capital goods have climbed.

Our postwar capital investment has repaired the worst of the obsolescence accumulated during the depression and war years. But huge amounts of old equipment are still in use, as shown by the table above. This is based on a survey of the age of manufacturing capacity in several hundred companies, representing all of the major manufacturing industries. Almost 50% of our present capacity was installed before or during World War II. More than 65% was installed before Korea. Expert studies of the major non-manufacturing industries show that the age of equipment, in those industries, is even greater.

Thus, of all business plant and equipment, less than one-third is modern in the sense of "new" since 1950; two-thirds is pre-Korea.

This over-all figure is confirmed by a check on specific industries:

- Nearly two-thirds of our metalworking equipment was installed over 10 years ago, according to preliminary results of AMERICAN MACHINIST'S 1958 census.
- Over 65% of the freight cars on our railroads are more than 10 years old.
- Less than half the capacity to process chemicals, rubber or petroleum is new since 1950 – a period that has seen rapid development in such equipment as automatic controls for these process industries.

These examples take on a dollars-and-cents meaning when we recognize that the latest machine tools are about 40% more productive than 1948 models, and that a combination of new freight cars and modern freight yard equipment can reduce operating costs up to 50%. New instruments, that automatically direct the flow of a chemical (or other raw material) process, can often reduce processing costs enough to pay back the cost of the instruments in one year. These savings cannot be made in older plants. By using obsolete facilities, our industries accept a waste in labor and materials that totals many billions of dollars per year.

Why Productivity Must Rise

The U.S.A. can ill afford this waste. In the economic struggle between the free world and Communist world, our margin of superiority depends on the efficiency of our productive facilities.

For the growth of our own economy, we shall need a sharp rise in productive efficiency. During the next ten years, American business must provide the goods and services required for a population that will increase by 32 million. And the increased population will expect higher living standards. Furthermore, the population in ten years will include a higher proportion of dependent persons – children and retired people – and a smaller proportion of working age men. Thus, with a relatively smaller labor force, industry must provide more goods for more consumers.

At the same time, industry must strive to hold the line against rising costs. In an economy with a tight

labor supply, we cannot count on restraint in wage demands, however desirable such a development might be. In the past ten years, hourly wage rates have increased over 5% per year, nearly twice as fast as output per manhour. And this disparity may well continue – causing still more inflation–unless we make more rapid gains in productivity.

We can make these rapid gains – if industry goes all out to modernize its equipment. Output per manhour (in manufacturing) has increased only 2.5% per year since 1951. But this compares with gains of 4% a year in 1947-1950, and over 5% in the 1920s. Today the machines and techniques are available for us to equal, or exceed, these records – to raise output per manhour at least 5% per year. This is a job that can, and indeed must be done, to assure growth in the economy without inflation.

The Job Ahead

The dimensions of this opportunity are shown by the table on the previous page. In its survey on the need for modernization, the McGraw-Hill Department of Economics asked a wide sample of manufacturing companies how much it would cost to replace *all* their out-dated facilities with the best new equipment available. The Department also interviewed experts in each of the nonmanufacturing industries, to find answers to this question. The answers add up to a staggering bill for new plant and equipment.

Modernization of over-age facilities – replacing only what is really obsolete, by today's production standards – would require a total capital investment of $95 billion, or nearly $20 billion per year for the next 5 years.

Furthermore, new production techniques will soon make *today's* plants obsolete, in many cases. Thus, to keep pace with technical advance *from 1958 on*, will require continuing expenditures of $8 to $10 billion per year for modernization.[1]

The total expenditure to wipe out the backlog of obsolete facilities, and keep up with continuing technical advance between now and 1963, would be at least $135 billion.

The U.S.A. has never spent such a sum on the modernization of industrial facilities. Capital expenditures of boom dimension have, in the past, been associated only with the urgent expansion of capacity. **Some forecasters are now saying that because industrial capacity is adequate, the next few years will be a period of low capital investment. The figures above make clear that this would be a national calamity.** The opportunity is there–and the challenge–to invest record amounts of capital in the modernization of plant and equipment.

A National Problem

This also is a challenge to the U.S.A. as a nation. For 100 years, this nation has been looked to as the model of economic development by the rest of the world. For the first time, we face a serious challenge by another nation and another economic system that claims to be better. In a carefully documented 111 page study released in May, the U.S. State Department declared that "the most serious threat" to the U.S.A. today is the drive for economic supremacy by the Soviet Union.[2] Although a much smaller nation industrially than the U.S.A., the U.S.S.R. is today increasing its national output at a rate of 7% per year and its output per manhour by 4% per year.

The U.S.A. does not have to match these specific figures, which represent the results of forced labor in a country just starting to develop industrially. In the contest to win uncommitted nations, the statistics are not likely to be quoted exactly, in any case. But our over-all growth in national output and living standards must be so impressive as to leave no question of superiority. Our factories must be showplaces of modernization to the foreign visitor that will leave him unable to say "I saw much better" in Britain, or West Germany, or Russia.

This is the challenge to the nation –a political challenge to be sure. But it coincides with the challenge to the business community and the individual firm. And the way to meet it is the same: by thorough and rapid modernization of our plant and equipment – not by the slow and steady pace of recent years, but at an accelerated rate that reflects the greater pressure for output at lower cost.

Obstacles To Be Overcome

We must face up to the fact that real obstacles – both technical and financial–stand in the way of faster modernization. Some companies do not have the technical "know-how" required for the latest production techniques. Many more lack the financial resources. How can we overcome such obstacles, and speed up the replacement of old facilities?

In the course of its study, the Department of Economics obtained comments on these questions from many executives. One of the problems, as we noted above, has been the urgent pressure to expand capacity during most of the postwar period. In giving their attention to this problem, companies have sometimes overlooked the chance to modernize older plants.

In some cases, equipment has been kept in place because it was satisfactory, and the users were not aware of still newer designs. Some equipment users believe that equipment makers are not sufficiently aggressive in designing and demonstrating new models.

The biggest obstacle – and one that presents a persistent problem – is the shortage of funds in many companies that need and want to modernize. For all corporations, the cash flow from retained earnings and depreciation has increased by more than $5 billion from 1953 to 1958. But a number of key indus-

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[1] This estimate is based on technical developments reported by McGraw-Hill editors and current price trends for capital goods. It is consistent with the plans for modernization expenditures in 1958-61 reported by companies in a McGraw-Hill survey conducted in April, 1958.

[2] "The Sino-Soviet Economic Offensive in the Less Developed Countries" – U.S. Department of State, May, 1958.

MODERNIZATION PAYS

Profits on modernization—like all business profits—have come down since 1955. However, modernization, in contrast to new capacity, still offers a relatively quick return on investment. Here are companies' answers to the question: "In cases where you are actually replacing old facilities with new plant and equipment in 1958—how soon do you expect these replacement expenditures to pay off?"

	PERCENT OF COMPANIES ANSWERING			
INDUSTRY:	1 to 2 yrs.	3 to 5 yrs.	6 to 8 yrs.	9 yrs. and over
Iron and Steel	11%	56%	11%	22%
Nonferrous Metals	29	71	0	0
Machinery	12	56	12	20
Electrical Machinery	29	57	7	7
Autos, Trucks and Parts	40	60	0	0
Transportation Equipment (aircraft, ships, railroad equipment)	7	53	20	20
Other Metalworking	38	33	10	19
Chemicals	10	53	21	16
Paper and Pulp	22	22	22	34
Rubber	33	33	34	0
Stone, Clay and Glass	0	57	36	7
Petroleum Refining	16	50	17	17
Food and Beverages	16	44	12	28
Textiles	37	47	5	11
Misc. Manufacturing	9	52	13	26
ALL MANUFACTURING*	18	50	14	18

**Note:* Answers to a similar question, in a 1955 McGraw-Hill survey, were as follows: 1-2 years: 17%, 3-5 years: 64%, 6-8 years: 11%, 9 years or more: 8%.

tries have failed to keep pace with the general trend. **These include some of the areas where the need for modernization is most urgent: the railroads, large sections of the textile industry, some mining industries and many small to medium-size companies in manufacturing generally.** The problem of these industries and companies has grown more acute in 1958 – since their profits have declined much more than the average for all business.

Any plan to step up the pace of modernization generally must deal with the special situation in these problem areas. Depressed industries and companies need outside help, if they are to modernize. Such help would include a stronger flow of technical information and advice (and occasionally, venture capital) from the more prosperous, inventive industries – as well as advice from equipment suppliers and distributors, industrial publishers and consultants. There is also a public responsibility to help in the problem areas—not with handouts of government money, but with technical assistance and help in finding private capital (like the efforts now being pursued by the Small Business Administration).

Certainly we should lose no time in reforming those provisions of the federal tax laws that now impede investment in modern equipment by hard-pressed firms – especially the outmoded and unfair restrictions on rates of depreciation for tax purposes. At present, the tax regulations require that depreciation be computed over relatively long periods of "useful life" for most types of equipment. And this is a primary reason for the lag in modernization. Machinery generally becomes obsolete long before the expiration of its "useful life" as specified in tax regulations. But it is difficult for companies – especially small companies – to set aside cash for rapid replacement, unless the full amount to be set aside is exempt from income tax. Canada and most European nations allow more rapid depreciation for tax purposes than does the United States.

A combination of self-help with technical help, and a fair break from the tax laws, would do much to reverse the spreading tide of obsolescence in depressed industries, and in many small companies.

PLAN '59

It is this combination that McGraw-Hill advocates as "PLAN '59", to help business modernize *now* for growth and profits. This is what it will take to make a start in 1959 on the $95 billion job of modernization, disclosed by the study we have just completed:

1. A better flow of technical information on where and how to modernize business plants and equipment.

2. Careful review by the individual company of its own opportunities to modernize at a profit – then action to replace obsolete facilities.

3. Reform of the tax laws, to allow more realistic deductions for depreciation, and permit more companies to finance adequate modernization programs from this source of funds.

Much of this program is already underway. The 34 McGraw-Hill Publications, and many suppliers and distributors of industrial equipment, have stepped up their information programs to start the modernization drive. Preliminary plans of manufacturing companies show a strong emphasis on capital spending for this purpose. In August, Congress passed a bill providing limited tax relief for small business.

But the real task of modernization still lies ahead. It is the greatest challenge, and the greatest opportunity, confronting American business as we move forward into 1959.

How Anaconda—Jurden Associates Achieve Modern Industrial Design

Mr. Jurden and his staff of specialists have designed and constructed more than a billion dollars worth of metallurgical and industrial plants. A special interview with Mr. Jurden and his staff brings out some of the important concepts that account for the success of this organization, now incorporated as the engineering firm of Anaconda-Jurden Associates, Inc.

WILBUR JURDEN, president and chief engineer of the new Anaconda-Jurden Associates, Incorporated.

AT THE VERY OUTSET Mr Jurden emphasizes that successful modern design can only be achieved by the cooperative efforts of specialists—men who are experts in such fields as electrical, steam power plant, structural, mechanical, hydraulic, architectural, dust and fume control, estimating, specification writing, expediting and inspection and liaison with staff and field engineers. "The development of a well-coordinated team of design specialists requires years of working together on the attainment of common goals," he says. It has been this asset that has led the Phelps Dodge Corp. to request the services of Mr. Jurden and his staff to design the famous Morenci plant which has long been regarded as a showplace of fine design; and the Erie Mining Co. to turn to Anaconda for the design of the $300-million Erie taconite plant, largest of its kind in the world.

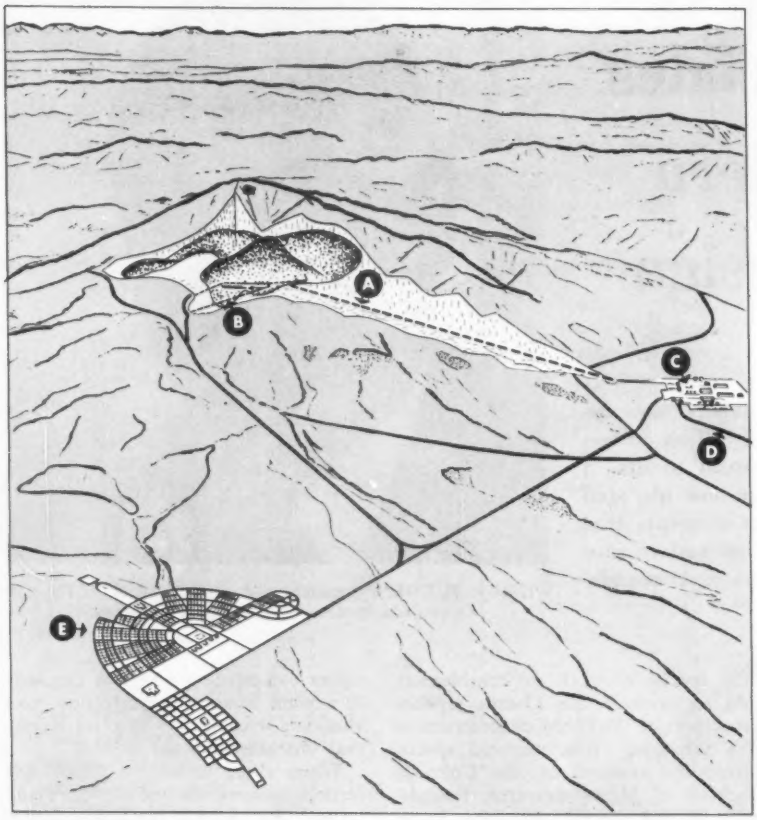
By way of example, Mr. Jurden notes that 25 men on his staff devote their full time to fume and dust control alone, because it is of growing importance in modern plants where cleanliness and pollution control are marks of advance. Stanley French, chief electrical engineer, adds that because modern plants have many sensitive automatic controls, and delicate electrical devices, dust simply cannot be tolerated.

If a problem arises which cannot be solved with absolute certainty within the organization, Anaconda-Jurden engineers do not hesitate to go outside for special research or consultation. As an example, the 17-mile pipeline transport of thickened concentrates at El Salvador, Chile, required special hydraulic research at the Colorado School of Mines Research Foundation. It took special consultants to design the tall earthquake-proof smelter stacks which Anaconda had to build in the earthquake areas of Chile.

At a recent press conference, Clyde Weed, Chairman of the Board of the Anaconda Company, paid one of the highest compliments to Mr. Jurden and his associates when he said, "When Wilbur Jurden builds a plant, it really operates—you don't have to rebuild the whole plant to get it going." When asked what he aimed to achieve in modern plant design, Mr. Jurden said, "It must be efficient; it must be economical in both design and operation; it must be free from unproven or experimental equipment and it should be architecturally attractive." Naturally, the emphasis on efficiency and the elimination of experimental equipment explain why Jurden-built plants run on the start-up.

Speaking of economy, Mr. Jurden points out that high labor costs prohibit some of the extravagances that were tolerated in old-time plant construction. Today, he says, we have to take advantage of the latest in construction methods including such units as batch concrete plants, batch concrete truck, and all the cranes and other materials handling units that speed up construction. With modern large earthmoving equipment, the designer can develop a terrain that will fit a plant location to perfection, and eliminate irregularities in plant layout that characterized old layouts.

When asked about the major difference between old and modern plant layouts, Mr. Jurden reached into the top drawer of his desk and produced an old yellowed print. This was a proposed plant layout for a crushing plant, concentrator, smelter and shops for a large mining project. On the proposed plan, the buildings were all askew, and tracks connecting the various buildings wound all over the terrain. Mr. Jurden was asked to see what he could do to "straighten this plan out." After several weeks of study and revision, he came up with a plan in which the buildings were arranged in an orderly right-angle pattern, distances between buildings were kept at a minimum to cut down construction costs and speed up the flow of material through the plant, and track layouts were straight and convenient to the buildings requiring rail facilities. To acomplish this, it was necessary to remove a few hundred thousand yards of earth material, cost of which was saved many times over by shorter trackage, pipelines, electrical distribution and conveyor systems. This orderly simplification of plant layout is evinced by the perspectives of Morenci and other large modern plants designed by Mr. Jurden and his associates, which appear on the walls of his office and point up the difference between old and modern design.



The main haulage tunnel (A) connecting orebody with the concentrator will be 14,000 ft long. **(B)** indicates intermediate haulage levels to develop the orebody for block caving. Mine ore will be crushed and concentrated at **(C).** Concentrates will be transported in slurry form via a 17-mile pipeline **(D)** to Llanta. From here concentrates will be hauled to the company smelter at Potrerillos. El Salvador's townsite **(E)** is planned for a population of 7,500. See plan on pp 100 and 101.

MODERN CONCEPTS of townsite and plant design for the El Salvador project of the Andes Copper Mining Co., in Chile, are discussed in this article.

El Salvador Plant Design Illustrates Three-Step Method

After plant capacity has been determined for an Anaconda project, plant layout proceeds on a three-step basis. "First," Mr. Jurden explains, "we start with the flowsheet developed by metallurgical engineers. Then we translate this into a mechanical flowsheet. This gives us size and special requirements. Finally we arrange the units into a compact plant layout which will perform efficiently, be economical to build, and allow for possible expansion." The following examples demonstrate how Anaconda's engineering and construction department followed this three-step concept at the new El Salvador plant in Chile.

Step 1. Metallurgical Flowsheet

Copper sulphide ores of the El Salvador mining project will be processed according to the simplified schematic flowsheet shown on the opposite page. After the requirements for crushing, grinding, classification, flotation and filtration have been established by metallurgists for optimum recovery, it becomes the problem of the design engineer to expand this schematic flowsheet to full-size plant. Each line on the flowsheet represents the transport of a solid, liquid or slurry requiring the installation of a pump, conveyor, feeder or other type of materials handling unit. In order to achieve a steady throughput in the plant, adequate storage facilities such as stockpiles and surge bins must be provided in the physical plant. Provisions must be made to carry away the hundreds of tons of concentrates and thousands of tons of tailing produced at the plant each day. Power requirements of the units in the plant require the design of substations, conduits and control centers. Finally the entire ensemble of equipment must be supported by foundations and housed. How this was accomplished at El Salvador is shown in Step 2, at right.

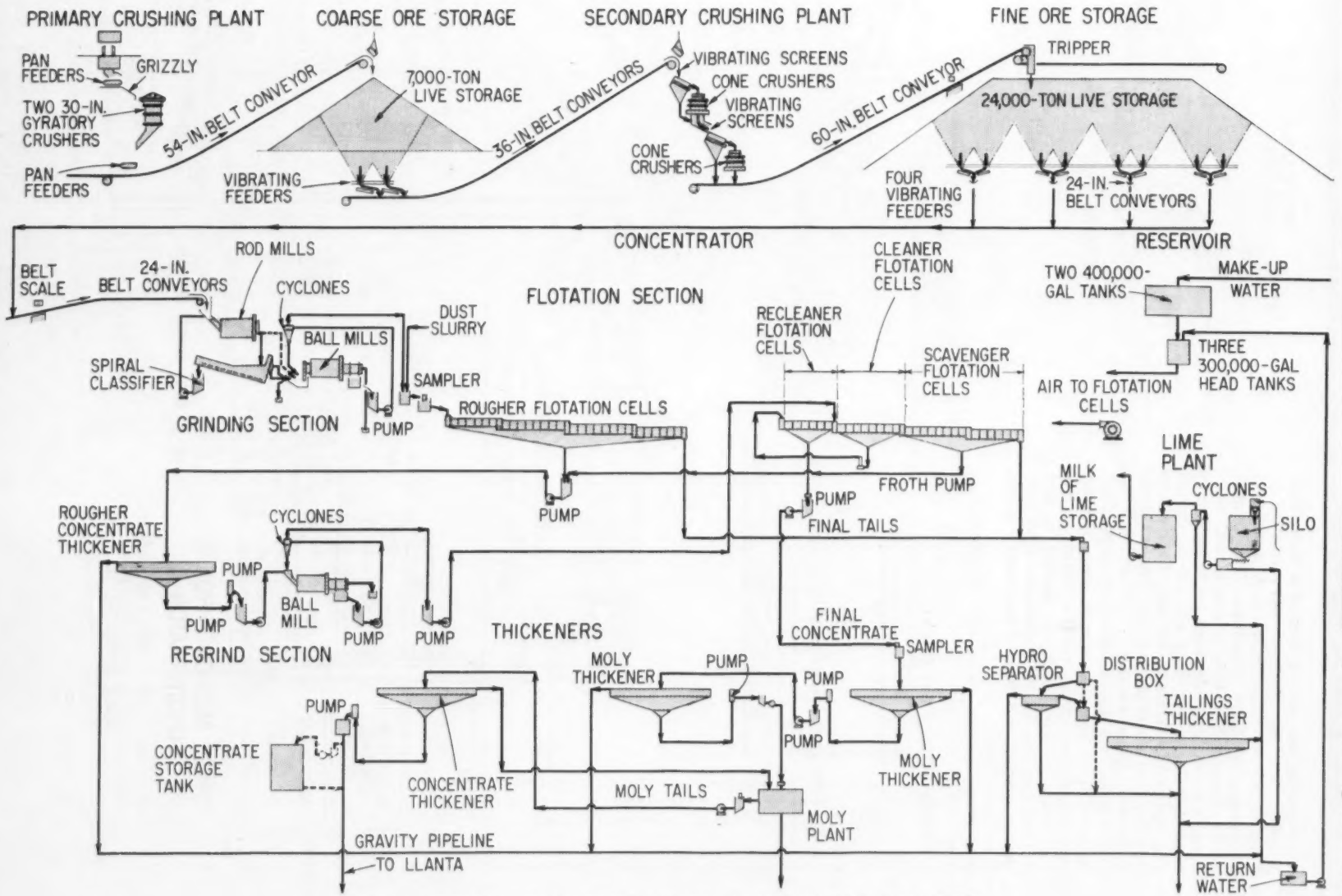
Step 2. Mechanical Flowsheet

Sections through the crushing plants and concentrator shown on pp 96 and 97 illustrate the need for many specialists in expanding the metallurgical flowsheet into a mechanical flowsheet. Design engineers experienced and trained in specific fields handle such details as plant structure, power distribution and controls, piping, lighting, heating, ventilation, dust control, materials handling, pumping and other hydraulic problems—all of which must be incorporated in a plant which is efficient, roomy, clean and of attractive architectural design.

Note the following features which are evident in the plant sections shown on the following pages:

1. Ample headroom and access to all equipment—particularly below the units in the concentrator.
2. Room for expansion or rearrangement of equipment if revisions need to be made to the flowsheet in the future.
3. Adequate crane facilities for handling and servicing such units as rod and ball mills, crushers, flotation machines, etc.
4. Materials handling facilities for heavy supplies such as balls and rods for the grinding section.
5. Electric power control rooms located at the center of loads. All main power distribution is carried through concrete tunnels built at the very start of the project.

The final step in engineering and design at El Salvador, plant layout, is illustrated on p 98.



METALLURGICAL FLOWSHEET FOR EL SALVADOR PROJECT

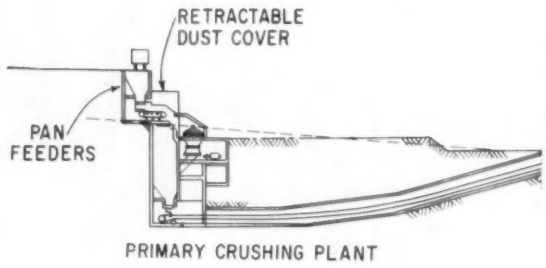
Step I. Metallurgical flowsheet

STEP 2. THE MECHANICAL FLOWSHEET

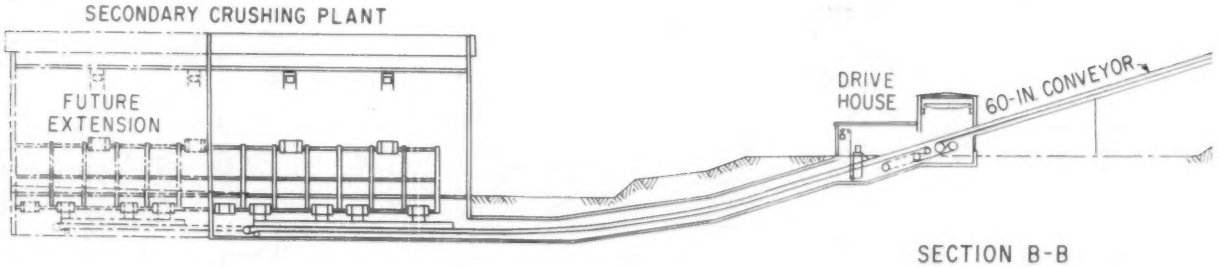
Materials handling equipment is stressed in plant design at El Salvador. Note the overhead cranes provided in crushing plants and the concentrator for the installation and maintenance of heavy equipment. The primary crusher without a roofed building is covered with a removable dust hood so that crusher parts can be handled by truck crane. Balls for the grinding mill will be charged from a car on tracks adjacent to the mills. Rods will be transported by car to a fixed position table from which the rods will be inserted (not injected) by a telescopic boom.

Dust removal and dust suppression are also emphasized. Main objective is to keep the dust in the processing system and out of plant atmosphere. The electric control rooms are under positive ventilation pressure to cool equipment and keep dust out. All crushers and other units where dust is generated are enclosed and under negative pressure to control dust.

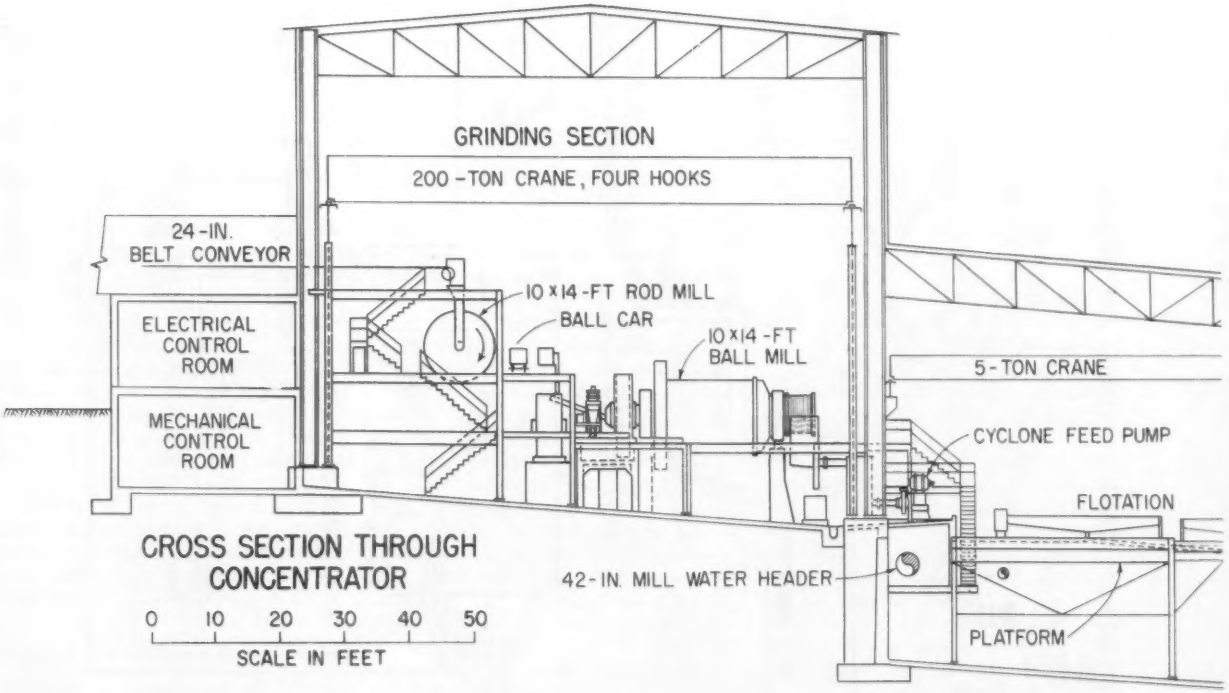
Location of the sections shown here is indicated on the plan on p 98.



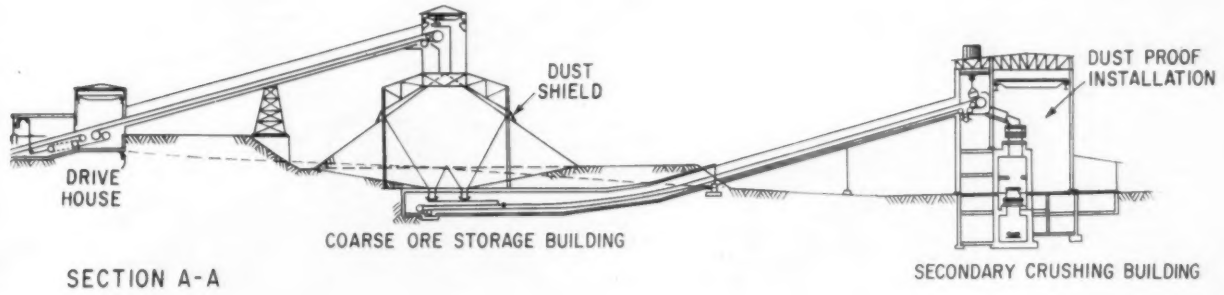
PRIMARY CRUSHING PLANT



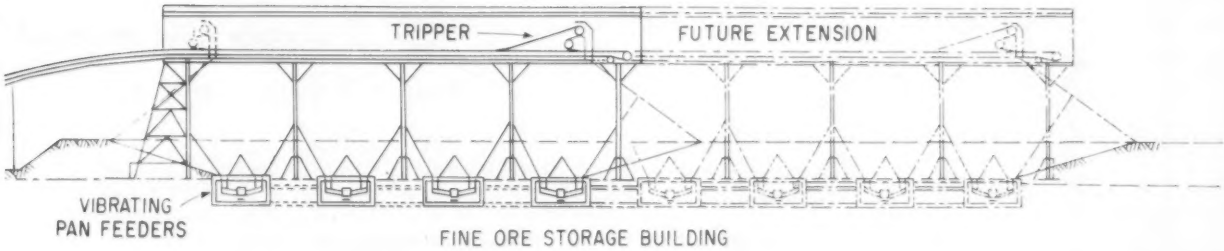
SECTION B-B

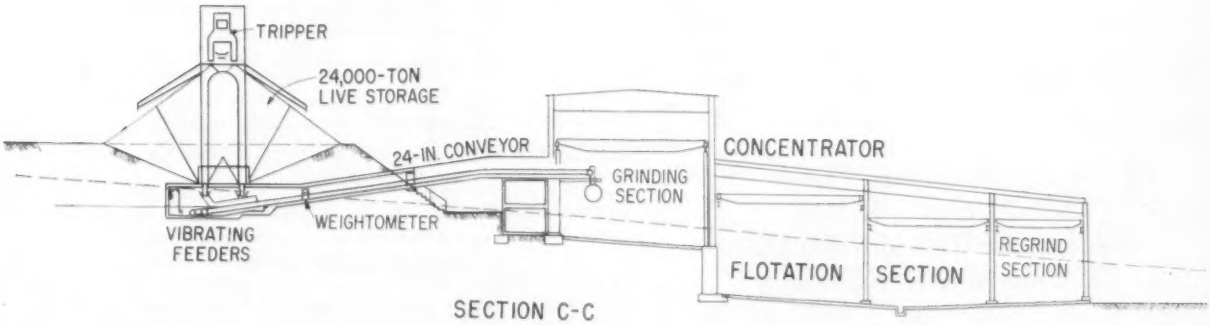


CROSS SECTION THROUGH CONCENTRATOR

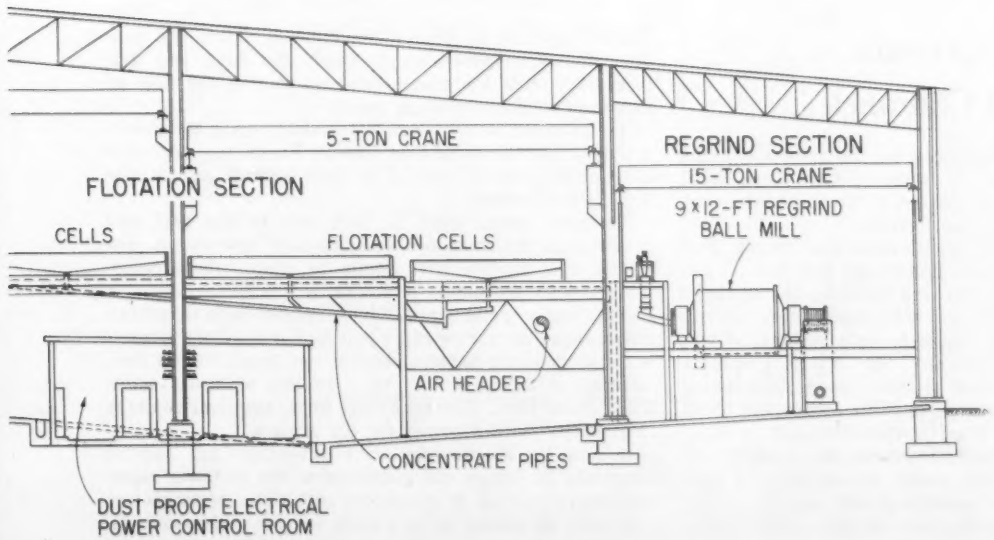


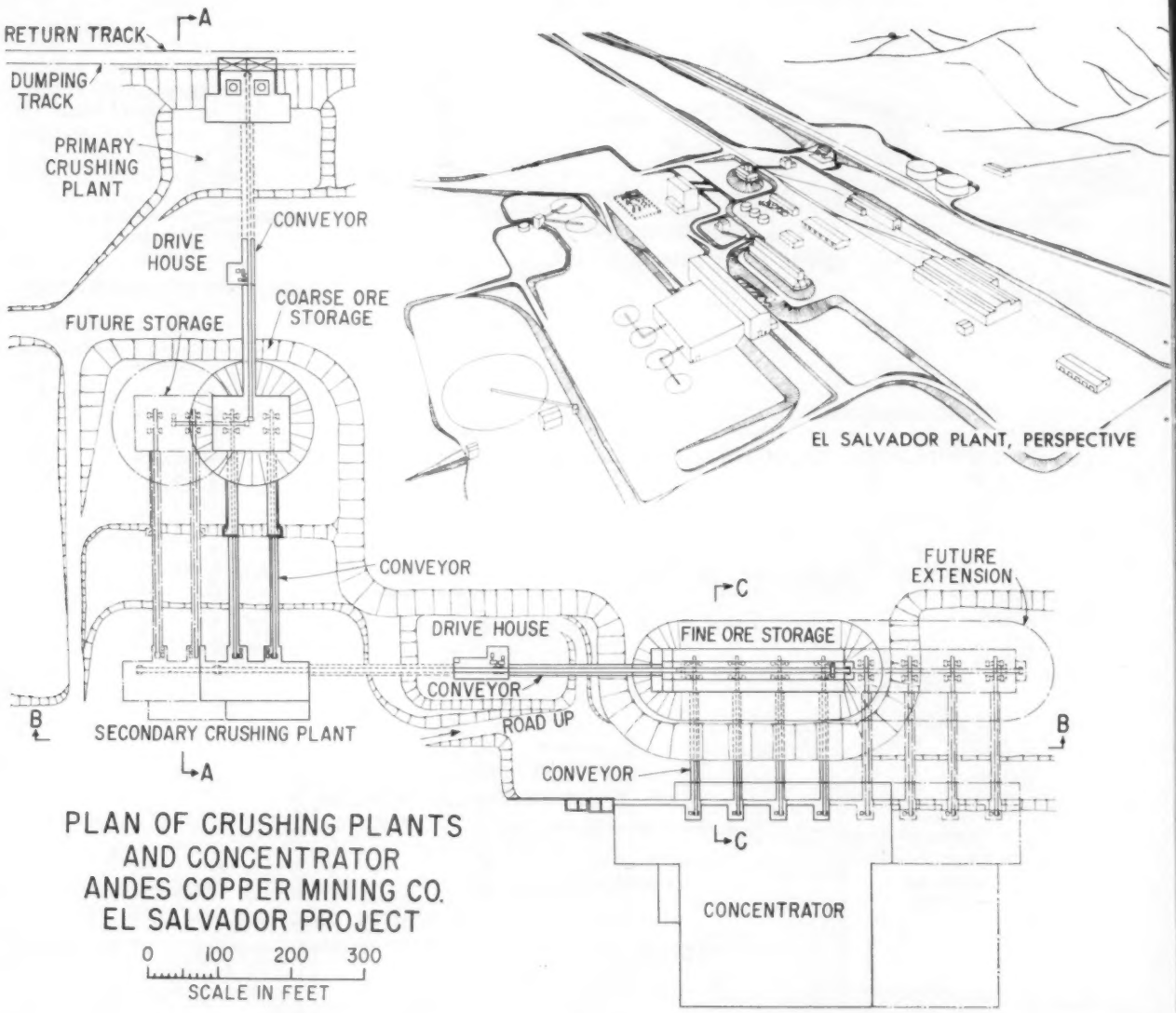
SECTION A-A





SECTION C-C





Modern Plant Layouts Are Clean and Compact

After the mechanical flowsheets for the various units of a project have been worked out, these units are coordinated in an over-all plant layout. In the above plant layout at El Salvador note the following features:

The layout is compact but flexible and roomy with ample space allowed for expansion of any unit with no loss of production. To achieve this, the buildings are arranged symmetrically so that conveyor belts transporting the ore are parallel to or at right angles to each building and to each other. In the concentrator, the ore is processed through a series of parallel circuits, again designed at right angles to a main feeding bin. This rectangular motif accounts for the orderly plant layouts designed by Anaconda-Jurden engineers, and eliminates many costly and specialized structures which would be necessary if conveyors were permitted to juncture at odd angles.

Notice the convenient location of the repair shops, spotted centrally to serve mine, crushing plants and concentrator. Warehouses which supply the shops and concentrating units are also located to shorten the flow of materials to ultimate usage points.

Transformer stations and power distribution equipment is placed near the large load centers. Travel time for operators from point of arrival to their various jobs is also kept at a minimum.

Railroad tracks used to haul ore to the mill and materials to the mine are designed with few curves, low grades and provide easy access to shops where equipment repairs are made.

The entire plant area is uncluttered with overhead power lines, surface pipelines and similar auxiliary systems because these are confined to concrete lined tunnels constructed at the very start of a project to house water lines, steam lines, compressed air lines, electrical conduits and similar items required for the project.

Such a layout provides many advantages not only in simplicity of design and construction but in lower maintenance costs, ease of operation, and higher tonnages per man day, all adding up to a lower per ton treatment cost.

"TO ENHANCE A COMMUNITY"— aim of American Brass Co.'s new plant and office building at Paramount, Calif.

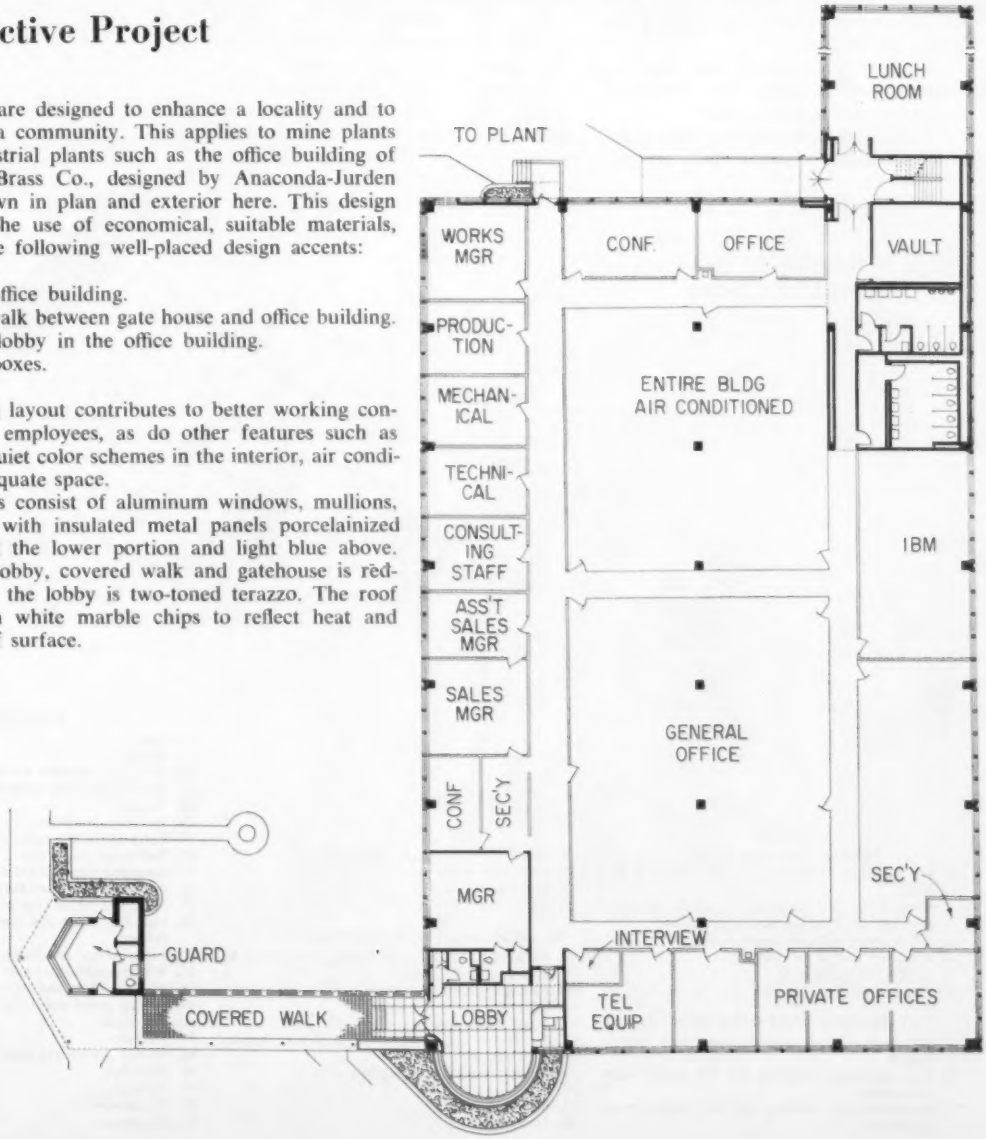
An Attractive Project

Modern plants are designed to enhance a locality and to be an asset to a community. This applies to mine plants as well as industrial plants such as the office building of the American Brass Co., designed by Anaconda-Jurden Associates, shown in plan and exterior here. This design was based on the use of economical, suitable materials, and features the following well-placed design accents:

1. Signs of office building.
2. Covered walk between gate house and office building.
3. Rounded lobby in the office building.
4. Planting boxes.

The one-level layout contributes to better working conditions for the employees, as do other features such as attractive and quiet color schemes in the interior, air conditioning and adequate space.

Exterior walls consist of aluminum windows, mullions, etc., combined with insulated metal panels porcelainized in dark blue at the lower portion and light blue above. Ceiling of the lobby, covered walk and gatehouse is redwood. Floor of the lobby is two-toned terazzo. The roof is covered with white marble chips to reflect heat and protect the roof surface.



Why was the El Salvador townsite planned as shown on these pages? This question was posed to Raymond Olson, architect for Anaconda-Jurden Associates, and here are some of the answers:

1. The curved layout was made to avoid the monotony displayed in many strictly gridiron pattern townsites.

2. The town was sited in a natural amphitheater. The terrain rises gradually from the focal point of the semicircle to the extremities of the townsite—a gradual rise of about 90 ft over a radius distance of about 2,000 ft.

3. El Salvador is a "walking community" in which central facilities such as the shopping center, union halls, public offices, and church near the plaza are within easy walking distance of all homes.

4. Recreation areas and facilities are stressed as shown by the tinted areas on the townsite plan.

5. Transportation of employees and laborers to the mine is made as convenient to all dwellers as possible. Note the numerous bus stops on the centrally located semicircular arc.

6. With a view to safety for small children, schools were located away from traffic areas, so that children can go to and from school in the comparatively traffic-free areas on the periphery of the townsite.

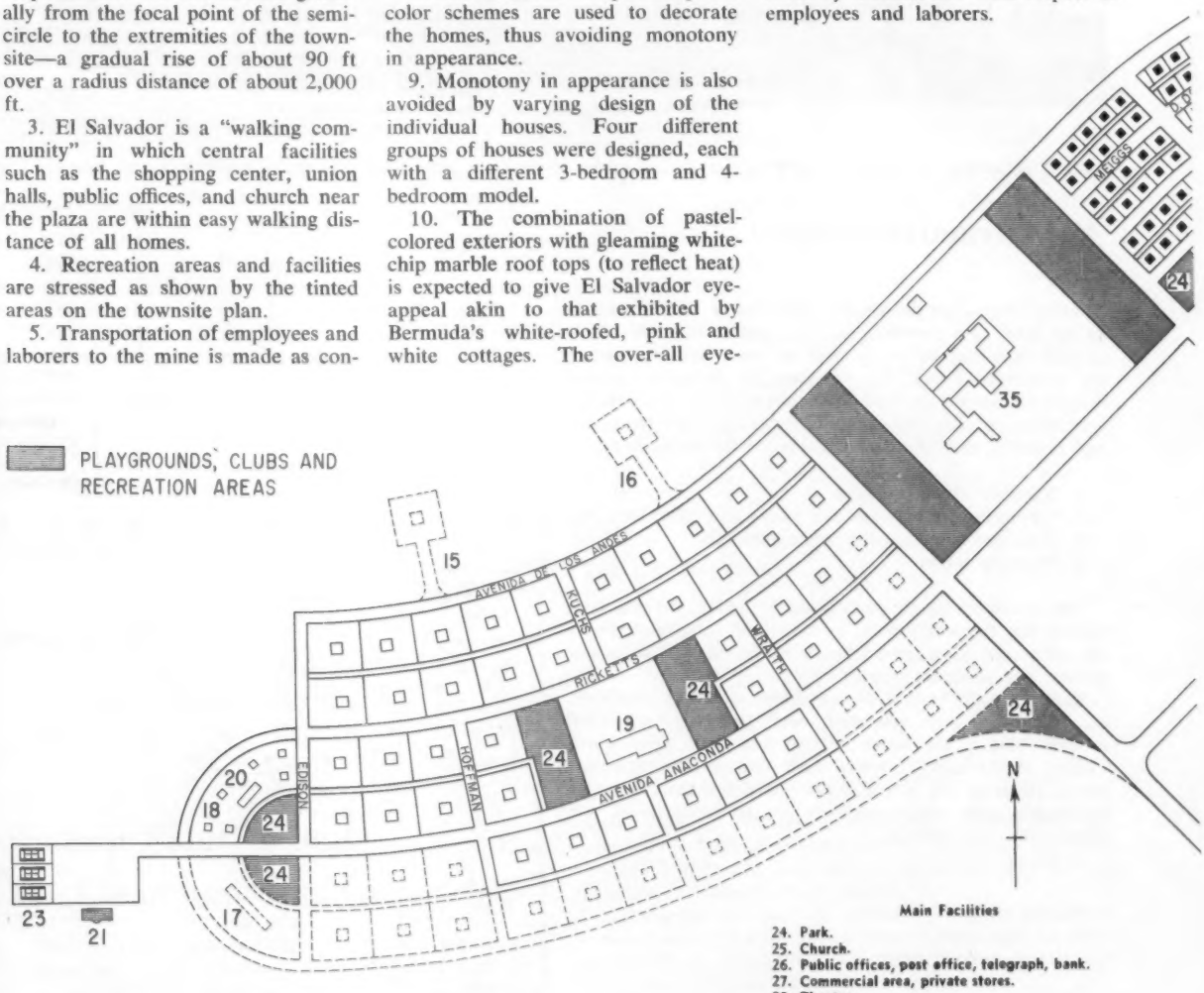
7. The hospital is convenient to all residential sections.

8. Ten different compatible pastel color schemes are used to decorate the homes, thus avoiding monotony in appearance.

9. Monotony in appearance is also avoided by varying design of the individual houses. Four different groups of houses were designed, each with a different 3-bedroom and 4-bedroom model.

10. The combination of pastel-colored exteriors with gleaming white-chip marble roof tops (to reflect heat) is expected to give El Salvador eye-appeal akin to that exhibited by Bermuda's white-roofed, pink and white cottages. The over-all eye-appeal of El Salvador will be enhanced by the fact that the houses will be situated on a series of gradually rising semicircles from the Plaza to the borders of the townsite.

Other objectives of townsite design are indicated in the legend below. The symbols within each housing plot indicate the variety of designs and types that will be constructed. This townsite meets the requirements set forth by Chilean law with respect to employees and laborers.



LEGEND

Laborers' Residential Section

1. 413 two-story duplex houses for married workmen.
2. Three hotel type buildings for single workmen, each having accommodations for 150 men.
3. Three dining halls for single men.
4. Workmen's union hall (future).
5. Workmen's social club.
6. Playgrounds.

Employees' Residential Section

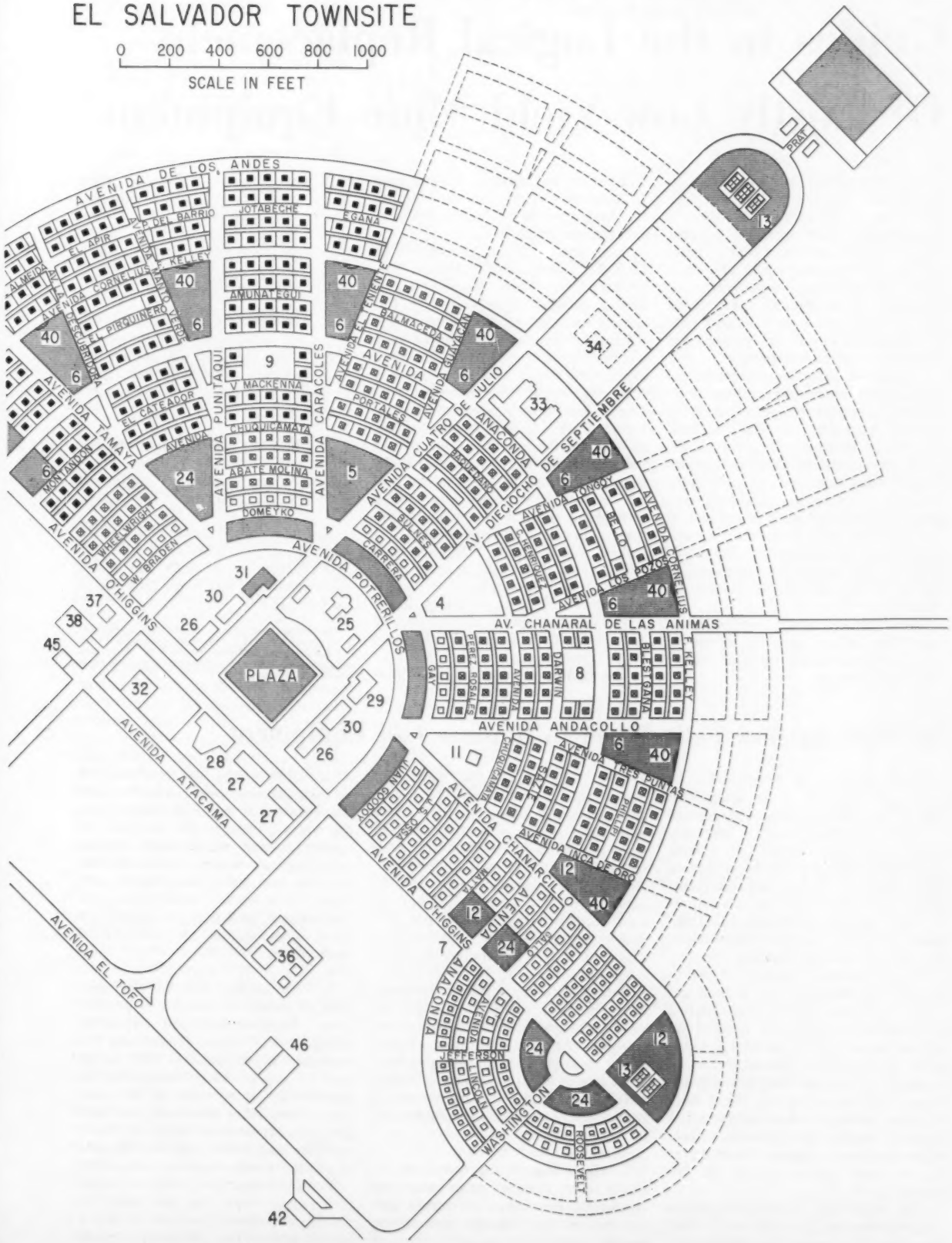
7. 72 single houses and 87 two-story duplex houses.
8. One hotel type building for 150 single male employees.
9. One hotel type building for 150 single female employees.
10. Dining halls for single employees.
11. Employees union hall.
12. Playgrounds.
13. Tennis court area.

Supervisory Staff Residential Section

14. 40 houses for married employees (2 will be used as guest houses).
15. Manager's house (future).
16. Director's house (future).
17. Guest house (future).
18. Six double occupancy single employees houses.
19. Staff school.
20. Foreign employees dining hall.
21. Club.
22. Golf course.
23. Tennis court.

Main Facilities

24. Park.
25. Church.
26. Public offices, post office, telegraph, bank.
27. Commercial area, private stores.
28. Theater.
29. Hotel for transients.
30. Restaurants, tea room, drug store, barber shop.
31. Employees' social club.
32. Company store and bakery.
33. Chilean primary and secondary school.
34. Technical school (future).
35. Hospital, clinic and nurses' quarters (hospital-future).
36. Police office and living quarters for personnel.
37. Welfare and employment office.
38. Welfare, shops and storage.
39. Animal corral and slaughter house.
40. Bus depots.
41. Stadium.
42. Service station and public garage.
43. Cemetery.
44. Airfield.
45. Fire station.
46. Bus garage.


EL SALVADOR TOWNSITE
0 200 400 600 800 1000
SCALE IN FEET
AVENIDA DE LOS ANDES
AVENIDA CORNELIUS VANDERBILT WHITNEY
AVENIDA TAMAYA
AVENIDA PUNITAQUI
AVENIDA CARACOLES
AVENIDA EL TENIENTE
AVENIDA CUATRO DE JULIO
AVENIDA DIECIOCHO DE SEPTIEMBRE
AVENIDA POTRERILLOS
AVENIDA O'HIGGINS
AVENIDA ATACAMA
AVENIDA EL TOFO
AV. CHANARAL DE LAS ANIMAS
AVENIDA ANDACOLLO
AVENIDA CHANARCILLO
AVENIDA INCA DE ORO
AVENIDA LOS POZOS
AVENIDA CORNELIUS VANDERBILT
F. KELLEY
PLAZA
JOTABECHE
EGANA
AMUNATEGUI
V. MACKENNA
CHUQUICAMATA
ABATE MOLINA
DOMEYKO
PORTALES
BALMACEDA
CARRERA
BELLO
DARWIN
ANACONDA
JEFFERSON
LINCOLN
WASHINGTON
ROOSEVELT
PRAT

Guides to the Logical Replacement Of Costly Low-Yield Mine Equipment

THE SYSTEMATIC REPLACEMENT of equipment which performs inefficiently or at high unit costs, rates a high priority on the agenda of modern scientific management. There is obviously an economic point at which most equipment should be junked or replaced. In some cases the replacement consists of an entirely new type of equipment—such as cyclones for classifiers in some instances.

A study of chapters on replacement of machinery and equipment in industrial engineering handbooks will reveal several approaches to the problem. The MAPI formula[1], for instance, devised by the Machinery and Allied Products Institute, compares the capital cost per year and operating performance of an old piece of equipment (the defender) with that of a proposed new piece of equipment (the challenger), and enables management to decide if and when to make replacement[1].

The "annual cost" method compares the annual costs of obtaining a service from various pieces of equipment under study.

The "present worth", PW, method reduces all receipts and expenditures for each possible equipment selection to a present worth basis.

In an article, "When Should a Rock Drill Be Dismantled?",[2] *E&MJ*, September 1943, T. M. Waterland presented detailed records on the frequency and cost of replacement parts for rock drills. Data were based upon a complete set of records for 23 standard Leyner drills that had drilled a total of 1,546,321 ft. The records included cost and frequency of replacement of 45 different machine parts, as well as the salvage value of the parts at the end of the study. On the basis of the records, the average cost per foot of hole drilled was plotted throughout the life of a machine expressed in terms of thousands of feet drilled. As a result, Waterland was able to conclude that a rock drill should have been replaced by a new one when it became necessary to install a new cylinder in the old one, or after a drill had completed about 65,000 ft of hole.

The significant point in the Waterland method is that a carefully planned system of keeping records was developed which revealed the answer to the replacement problem. This is typical of most replacements studies.

Records required for replacement studies fall into three categories:

1. Acquisition costs which include first cost, installation cost; future salvage costs; costs of equipment and tools that have to be bought or rented to install, salvage or relocate a piece of equipment.

2. Operating costs which include direct and indirect labor, power, taxes, insurance, use of auxiliary equipment such as cranes and cost of floor space.

3. Maintenance costs including labor for repairs, lubrication, painting and cleaning, spare parts and spare-parts inventory, and down time due to inspections.

[1] Industrial Engineering Handbook, McGraw-Hill Book Co., H.B. Maynard, Editor-in-Chief.
[2] Article was published when T.M. Waterland was efficiency and research engineer for Britannia Mining & Smelting Co.

METRE Method Tells When to Replace Old Equipment

WHEN SHOULD an old machine be replaced? How can it be determined that it is more economical to replace present equipment with a new machine, particularly when the present machinery appears to be operating satisfactorily? These are questions posed quite frequently in the minds of many owners. And the replies appear to have been as numerous as the people seeking answers.

Several methods are now in use in the field to determine the economical time to replace. One owner pointed out that when a tractor reached an age of three years it became a headache. He didn't like headaches, so he replaced his tractor every three years. Some companies replace their tractors just before a major overhaul is needed. Another method is to replace older machines whenever there seems to be some extra money in the treasury.

The METRE (Most Economical Time to Replace Equipment) method has been developed by Caterpillar Tractor Co. to aid the equipment owner to detect the point of lowest possible hourly operating costs. This important factor can be removed from the realm of intuition and evaluated on a dollar and cents basis. Accuracy is dependent upon specific data the owner can supply from his own records. This method was primarily worked out for crawler tractors, but it can be applied to other types of equipment.

Before getting into the mathematics of economical replacement, let's review some of the factors to be considered. The first and most evident factor is major repair and overhaul costs. But of equal importance, though not so apparent, are the costs of productivity, unavailability and capital decline.

1. Major Repair and Overhaul. As the tractor or any other piece of equipment gets older, the repair cost gets higher. For example, the engine would require only rings, liners and a valve job on the first overhaul, but on the second might require new crankshaft, bearings and pistons, plus the same items as on the first. A similar pattern would apply to the cable control, master clutch, steering clutches and other components serviced as a whole. Attachments can be included, and tires substituted for track components on rubber-tired units.

2. Productivity. One of the most difficult factors to measure is productivity. Improvements are constantly being made. Tractor horsepower has increased approximately 20% in the last 10 years. While horsepower is not directly proportional to increased production, other improvements, such as hydraulic-boosted controls, better visibility and better stability, increase at about the same rate as horsepower.

If an old tractor is used, it should be charged with the difference in ability to produce between it and a new machine. The old tractor should

be charged for its inability to produce as much as the new tractor.

The charge, however, need not be made in all cases. If the old machine can supply all the needs of a crusher plant, a new machine can add no productivity. In this case, productivity is governed by the unit it is working with, rather than the tractor itself.

The charge may be made in several ways. If it is working alone, a fair, although conservative, way would be to charge the tractor with the cost of renting a machine to make up the lost production. If the tractor is push-loading scrapers, it should be charged with the cost of renting such units to make up this lost production.

3. Availability. The machine should also be judged on the basis of availability, or the number of hours the machine is down in comparison to the number of hours it could have worked. This should not include any delays for minor adjustments, repairs and greasing.

A new tractor will usually be available about 96% of the time. The older a machine, the more time will be required for adjustments and repairs. To charge a tractor for not being available, compute the cost of renting a machine of comparable size during the time the tractor is not available.

4. Capital Decline. Equipment owners do not usually replace equipment every season, because the difference between original cost and trade-in value would cause prohibitive operating costs. This difference is called "Capital Decline". This cost, the difference between purchase price of a current machine and true value of the existing machine, should be charged to the tractor in the year the decline occurs, and not averaged over the life of the machine.

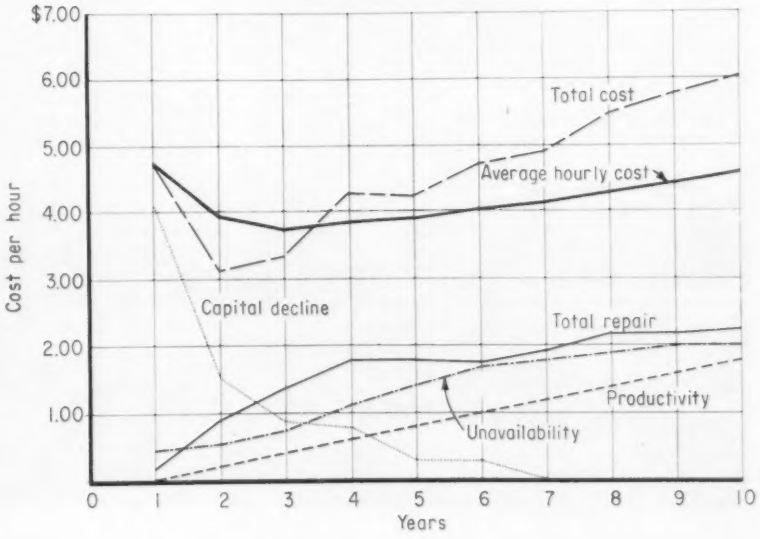
Applying the METRE Method

To determine the most economical time to replace equipment, find the total cost of major repairs and overhauls, productivity, availability, and capital decline for each year. Then average the costs of the first and second years to find the average cost per hour if traded at the end of two years. Do the same for the first three years, and so on, until the lowest cost per hour is found. The number of years which will produce the lowest hourly cost would be the number of years the tractor can be economically operated.

The charts will show how these rates are figured. In making these charts, Caterpillar used an average-sized machine, costing about $20,000, and assumed it would work 1,800 hours each of the first three years, and 1,500 hours each year thereafter. In this example, the lowest hourly rate occurred at the end of the third year. The 11 cents difference between the third and fourth years appears to be small, and many owners wonder why they should replace on such a small basis.

It must be understood that if the tractor was originally set up to operate for three years, the charge per hour for the fourth year would then be $4.25. The actual difference in dollars between the third and fourth year operation would be $759.00 (or 6,900 hours at 11 cents per hour).

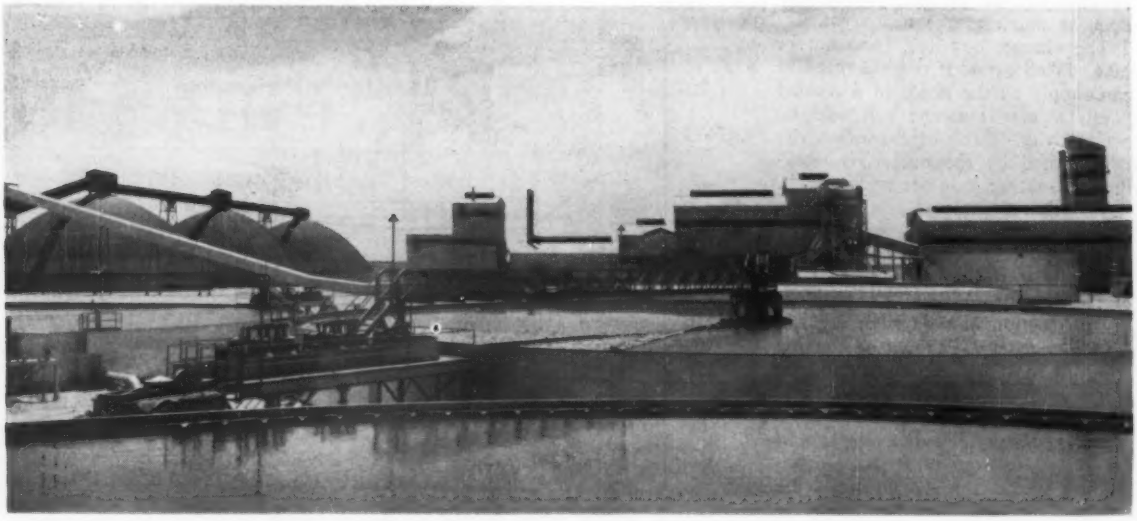
METRE Method Factors

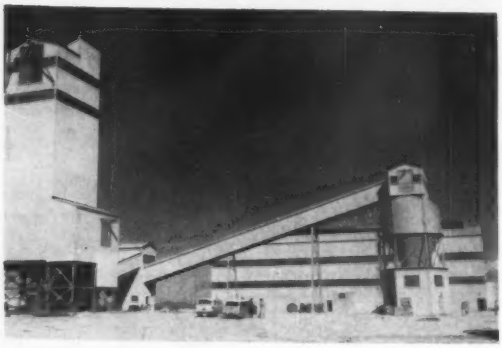


Work Sheet for Determining Economic Life of Track-Type Tractors

Years	1	2	3	4	5	6	7	8	9	10
Hours operated each year	1800	1800	1800	1500	1500	1500	1500	1500	1500	1500
Total hours at end of year	1800	3600	5400	6900	8400	9900	11400	12900	14400	15900
Major components	**Repair and Overhaul Cost ($) Per Hour**									
Engine	0	0	0	.12	.12	.12	.12	.23	.23	.23
Steering clutches	0	0	.09	.09	.09	.09	.09	.09	.09	.09
Brakes	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07
Tracks	0	.62	.62	.62	.62	.62	.62	.62	.62	.62
Cable control	0	.03	.03	.07	.07	.06	.06	.07	.07	.07
Roller frame & sprocket group	0	0	.38	.38	.38	.38	.49	.49	.49	.55
Master clutch	0	0	0	0	0	0	.06	.06	.06	.06
End bits & cutting edges	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
Transmission & final drives	0	0	0	.14	.14	.14	.14	.29	.29	.29
Guards, hoods, fenders	0	.09	.09	.18	.18	.18	.18	.18	.18	.18
Cost per hour										
Total repair & overhaul	.15	.89	1.36	1.75	1.75	1.74	1.91	2.18	2.18	2.24
Productivity	0	.20	.40	.60	.80	1.00	1.20	1.40	1.60	1.80
Unavailability	.40	.50	.70	1.10	1.40	1.70	1.80	1.90	2.00	2.00
Capital decline	4.22	1.55	.89	.80	.27	.27	0	0	0	0
Total*	4.77	3.14	3.35	4.25	4.22	4.71	4.91	5.48	5.78	6.04
Average hourly cost if tractor is replaced at end of given year	4.77	3.95	3.75	3.86	3.93	4.04	4.16	4.31	4.46	4.61

* *Excluding operator, fuel, grease, etc.*





STORAGE BINS, mill, refinery and headframes were combined horizontally by Stearns-Roger Manufacturing Co. for the layout of National Potash Co.'s plant at Carlsbad, N.M. Production is 4,800 tpd of potash for the agricultural industry from the Freeport Sulphur-Consolidation Coal facility. Bands of corrugated translucent green plastic ring the buildings for illumination of interiors without glare. Thickeners in the foreground (above) are laid out in a simple square.

New Designs Show

MODERN PLANT DESIGNERS are getting a "plus" profit in the layout and line of mine plants. The profit comes, not only in efficiency of operation and simplicity of product flow, but in the aesthetic beauty of the finished structure.

The second gain pays off in improved public relations, increased pride of association by employees, and better community relations all around.

These four pages illustrate some of the better examples of current mine plant design in this country and abroad. All of them embody the concepts that were espoused by one of the leaders in the field, Eugene R. Grace of Bethlehem Steel. Mr. Grace believed that a mine plant could be attractive and should "enhance the environment." Two excellent examples of that enhancement appear at the Grace mine in Pennsylvania and the Marmora property in

ARCHITECTURAL BEAUTY is a hallmark of many European mining properties. A prime example is 170,000 tons per year plant of Norwegian Iron Works, Inc., located at Mo I Rana in Central Norway. Here, again, the use of horizontal lines and softly contrasting colors add to beauty as well as to efficiency.

THE LANDSCAPE at Death Valley was changed radically by Southwestern Engineering Co. and Twaits-Wittenburg Co. with the design and construction of the new U.S. Borax & Chemical plant at Boron, Calif. Sweco-Twaits could take all the lateral room they wanted, so the plant is organized to follow processing through from the pit in the background to the rail loading at the right. Capacity is 3,000 tpd.

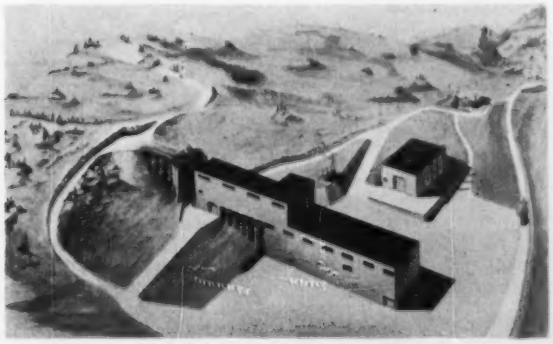
A Double Profit

Ontario, where the environment was disturbed as little as possible. Staff housing and administration buildings were moved in around trees and, on completion, complemented the rural setting.

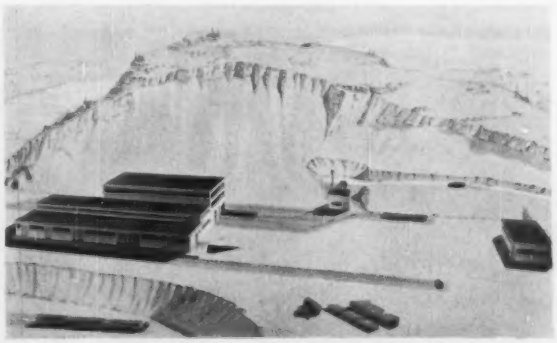
R.T. Lassiter, New York district manager for Western-Knapp Engineering Co., has also cited some trends in modern plant design which lead to better architecture in mine plants.

The trend toward horizontals in design offers economy in power expended to move material, in placement of various sections for improved product flow, and in creation of "open-end" design to permit easy and inexpensive expansion. Mr. Lassiter also notes the increased use of color, both as a safety feature of the modern plant, and as a tool to create better employee atmosphere and boost plant production.

"A WHITE CASTLE, gleaming in the wilderness" was the phrase that *Swedish Digest* used to describe the ore dressing plant at Kiruna, in Sweden. The modern plant also contains eight shafts with Asea friction hoists for underground mining of approximately 13-million tons of iron ore per year. Kiruna will exhaust its open pit workings by 1960 and has had to go underground. Swedish architect Hakon Ahlberg designed the plant for the national LKAB to operate in the extreme (minus 20 to minus 40-deg) temperature at Kiruna.

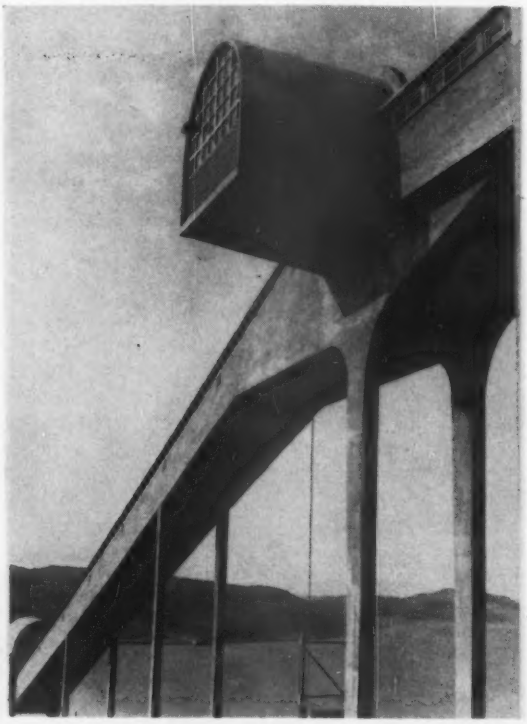


STRAIGHT LINE DESIGN is the key O. W. Walvoord, Inc. used in its plans for the Emperius Mining Co. lead and zinc mill at Creede, Colo. Artist's rendering shows the mill proper in the foreground receiving ore from trucks at left and the power plant located in the background.



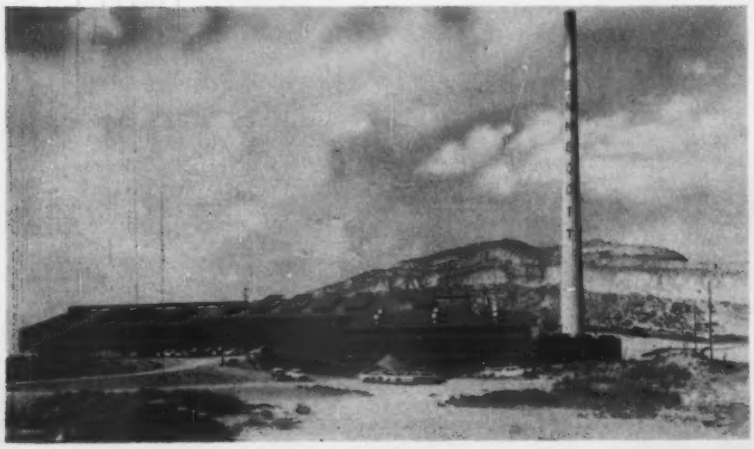
THE PORTAL, service buildings and administration layout of Kaiser Steel Corp.'s Koehler mine, at Raton, N.M. represent a unity of design that is a product of the joint efforts of R. G. Heers, manager of Kaiser's raw materials division, Kaiser Engineers, and the consulting service of O.W. Walvoord, Inc.

New and Old Materials Serve A Modern Planning Concept



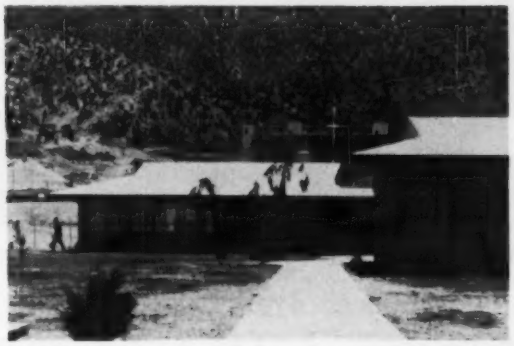
DISTINCTIVE USE of concrete for functional and attractive construction is a constantly growing trend in European mine plants. Norway's principal iron ore producer, Sydvaranger, Inc., located at Kirkenes in the northern sector, plans to put more than 1-million tons of concentrate through its conveyor system by the end of 1958.

4,000 TONS of uranium ore per day is the capacity of the Tuba City, Ariz. plant of Rare Metals Corporation of America, designed by Stearns-Roger Manufacturing Co. Company spokesmen note that simplicity of line is featured on all mill buildings "within the limitations of each individual plant."

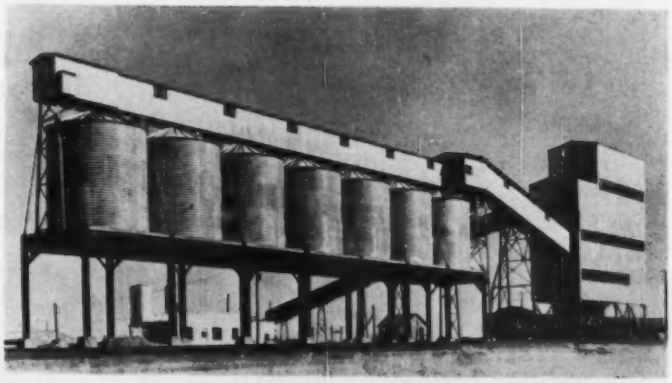


HORIZONTALS were used with great efficiency in the design of the new Hayden smelter of Kennecott Copper Corp.'s Ray Mines Division. Exterior of the smelter building is a brown-colored coated steel, and corrugated plastic of a blue tint provides illumination. Western-Knapp Engineering Co. worked with the Kennecott engineering staff on the plant, which includes a rather higher than usual ceiling to handle rising heat and fumes and keep the working floor at more comfortable temperatures.

CAREFUL ATTENTION to environment was the guide for Kaiser Engineers' plan for the Cushenbury limestone quarry of Permanente Cement Co., in San Bernardino County, Calif. Some plain and fancy horticulture was called for, along with a great deal of color sense. The latter was employed in the field of aesthetics and for efficiency. Exterior colors of the Permanente plant were chosen to harmonize with and complement the desert hues in the Lucerne Valley, and color for interiors was picked for safety identification and to illustrate product flow. The Kaiser engineers got into horticulture when it was decided to transplant full grown native Joshua trees of uniform size along the plant's approach road. Prior to the transplanting, compass readings were taken on each tree's relation to the sun.—Unless they are exactly oriented to the sun, they will die.



THE CLAYTON coal tipple, 18 miles north of Denver, was designed by Hack Engineering Co. to produce 350 tons per hour. Enclosed conveyor and silo tops, along with horizontal illumination panels exemplify clean, modern design.

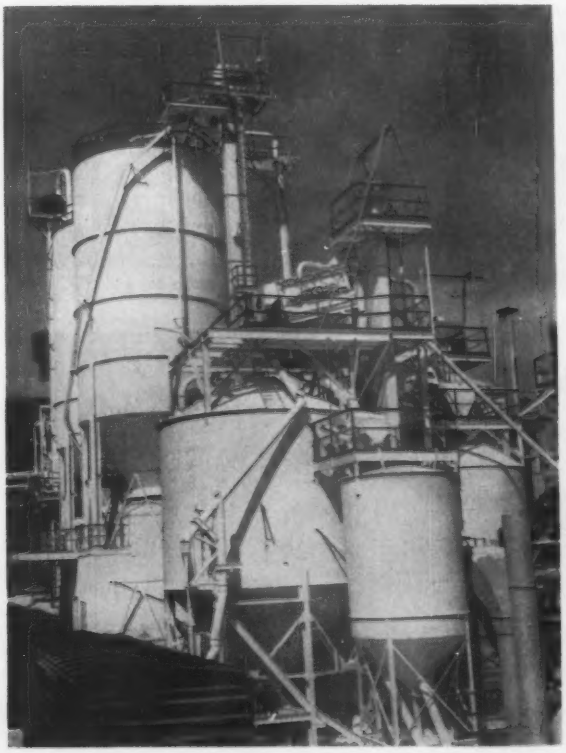


THE NORTHWEST CORNER of Colorado, at Maybell, is the site of Trace Elements Corp.'s uranium concentrating mill, which has a capacity of 300 tpd. Production is sold to AEC and ore supply comes from a group of neighboring open pit mines. The plant, designed by Southwestern Engineering Co. for the Union Carbide Co. subsidiary, was completed in late 1957.

COMBINATION of the fine coal washing plant and a Dorr-Oliver thickener at the Compass No. 3 mine of Clinchfield Coal Co., near Clarksburg, W. Va., was designed by Industrial Engineering & Construction Co. Three expansions were made at the 7,500-tpd coal plant in 1957. Backbone of the system is an extended conveyor belt system.

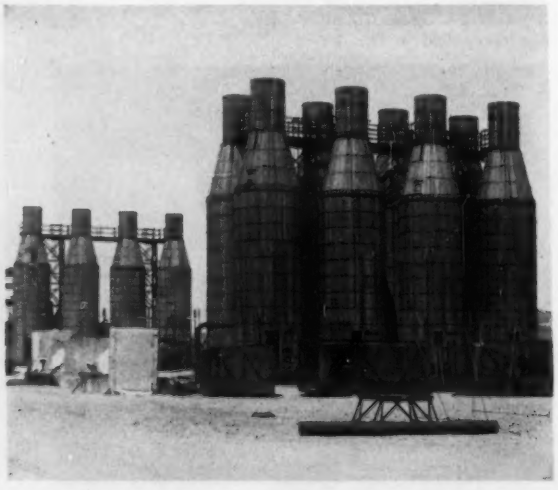
WET CYCLONE SCRUBBERS remove dust at Kaiser Gypsum Co. plant in California. Filters clean flash dryer gas discharge.

Why Air Pollution Control Pays



DUST COLLECTING SYSTEM at Kaiser Aluminum & Chemical Corp. plant, Baton Rouge, La., includes cloth filters at alumina bin and bagging machine, cyclones and scrubbers in the alumina hydrate section, cyclones in the briquette dryer section and in the alumina hydrate dryer to clean gas and air.

DUST CONTROL UNITS at Kaiser's Mead aluminum reduction plant in Washington include hoods to collect fumes from potline reduction cells, dry cyclonic type dust collectors to remove alumina dust, scrubbers to remove gaseous fluorides, and an electrostatic precipitator in the cryolite plant below.



The Engineering Approach to Air Pollution Control

"THE IMPORTANCE of air pollution control and materials recovery in present day planning is evidenced by the great interest of the public and various government agencies, in addition to industrial management and engineering staffs. Recently it was reported that industries are spending $300-million a year on air pollution control equipment.

"Objective planning in air pollution control and materials recovery achieves the most effective, economical solution. In existing plants, this involves complete surveys and studies of applicability of control methods and equipment, plant location and meteorological conditions.

"In new plants, the primary factors are the selection of plant location, process and control equipment—all based on use of data from similar processes and equipment.

"An independent engineering organization can be valuable in planning air pollution control programs because of broad experience in many industries and processes and with many types of equipment."

DAVID H. WHEELER, principal engineer, Air Pollution Control, Kaiser Engineers.

THE OBJECTIVES AND BENEFITS of an effective air pollution control program have been summed up as follows by Kaiser Engineers:

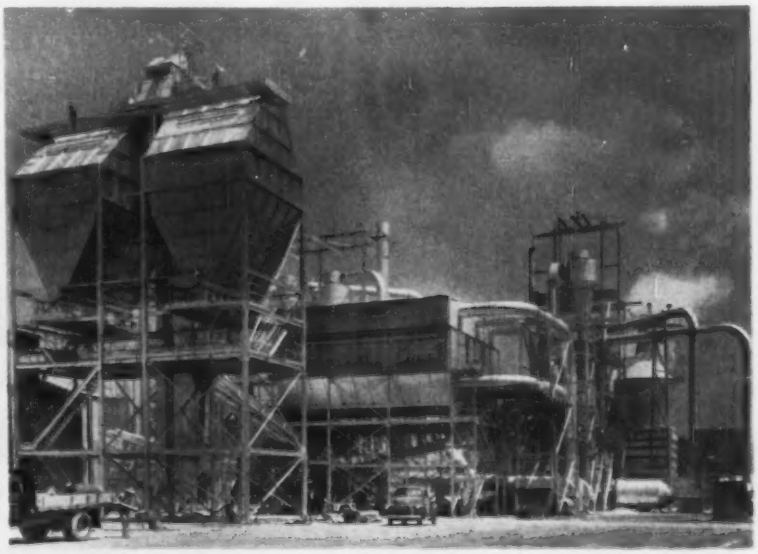
Effective dust or fume control systems provide:

1. Control of working environment for man and machines in the plant increases operator and operational efficiency. Reduces maintenance on machines, buildings and plant yards.
2. An industrial good neighbor policy. Improves personnel living conditions and plant community relations . . . and performs a community responsibility.
3. Recovery of valuable materials.
4. Clean combustible or process gas. Increases value of gas for industrial use.

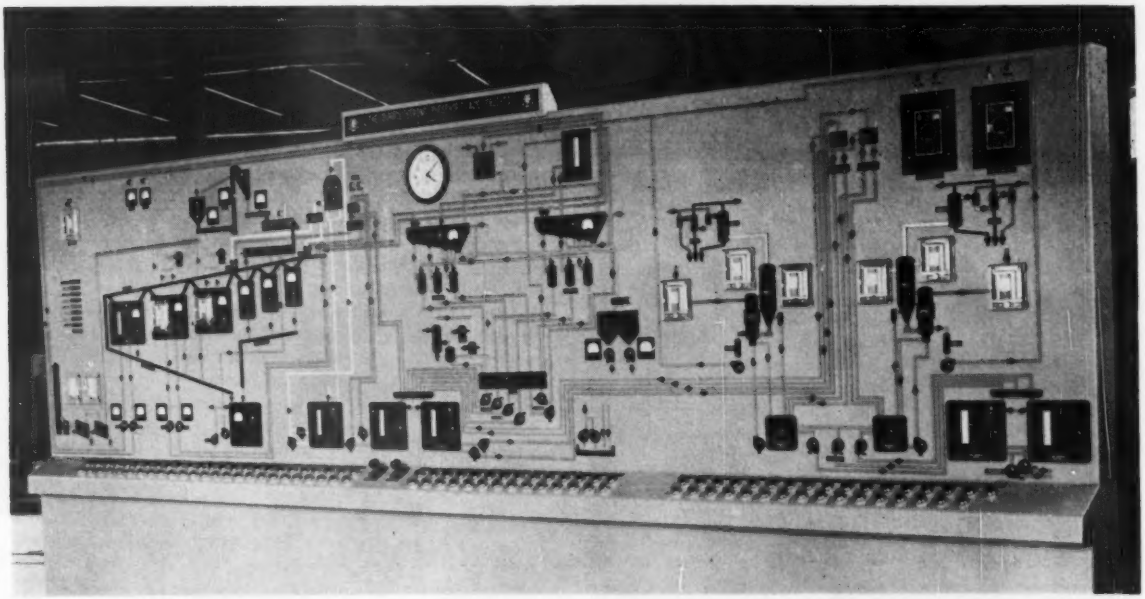
Factors which must be considered in the design of an effective control system are:

1. Collection efficiency.
2. Installation, operation and maintenance costs.
3. Type and characteristic of effluent.
4. Plant location and meteorological conditions.
5. Plant layout and process.
6. Hoods and duct systems.
7. Temperature control.
8. Gas and dust environment before entering the collector.
9. Gas conditioning or cooling.
10. Heat recovery.
11. Draft system—fan, stack height.
12. Collected dust handling system.
13. Duct, collector insulation, corrosion resistance.
14. Provision for future expansion and increased efficiency.

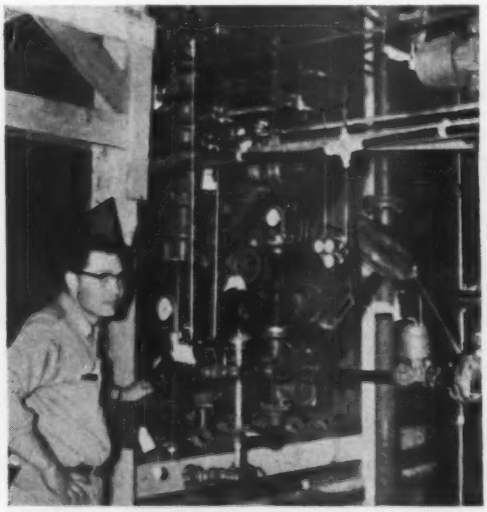
Installations shown here, designed by Kaiser Engineers, incorporate the foregoing factors pertaining to dust and fume control systems.



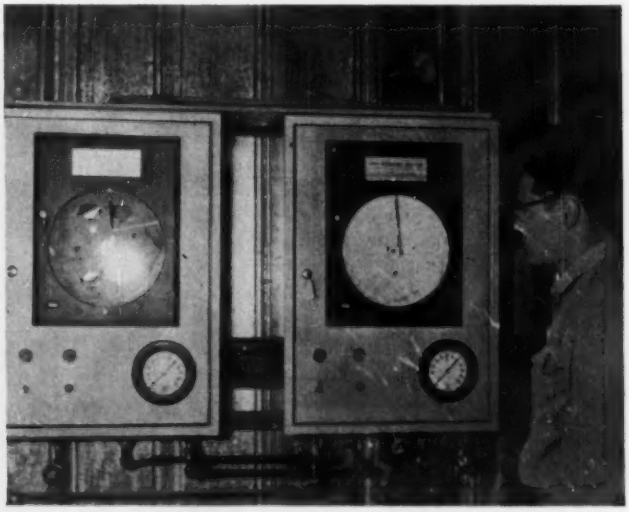
AIR-CLEANING EQUIPMENT at Great Lakes Carbon Corp.'s diatomaceous earth processing plant, Lompoc, Calif., includes a redwood tower scrubber which cleans exhaust process air, and a series of cyclones, separators and bag filters which remove dust from the final milling and classifying section of the plant. The bag filter recovers approximately 24 tons of valuable fines per day.



MODERN INSTRUMENT PANEL designed by Dorr-Oliver Co. for a Norwegian phosphate plant shows flowsheet with equipment under control in silhouette. Controls, switches and information are located inside cutouts.



INTRICATE SYSTEM of controls, pumps, pipes and valves in Dawn Mining Co. ion-exchange units.

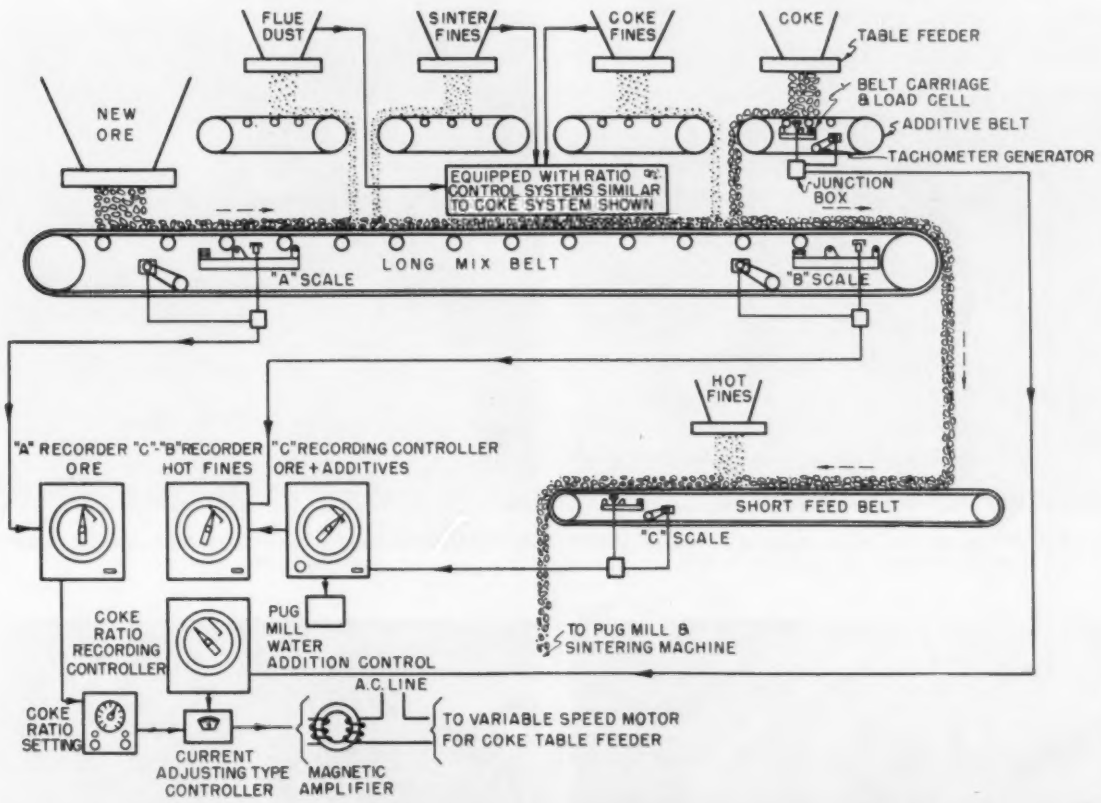


INDUSTRIAL ELECTRONICS CO. unit permits careful control over crushed ore feed to grinding circuit.

Automatic Controls Applied to Uranium Concentration

At Dawn Mining Co.'s plant, Ford, Wash., two belt scales are installed on the same belt. The average of these two is used as the mill weight. The scales check very accurately against weighed truck samples. If the two scales do not agree within close limits, the operator knows that they must be recalibrated. This advantage does not exist in single-scale weighing. Other instrumentation at Dawn Mining Co. is described by C. M. Marquardt as follows in *Mining Engineering*, September 1958:

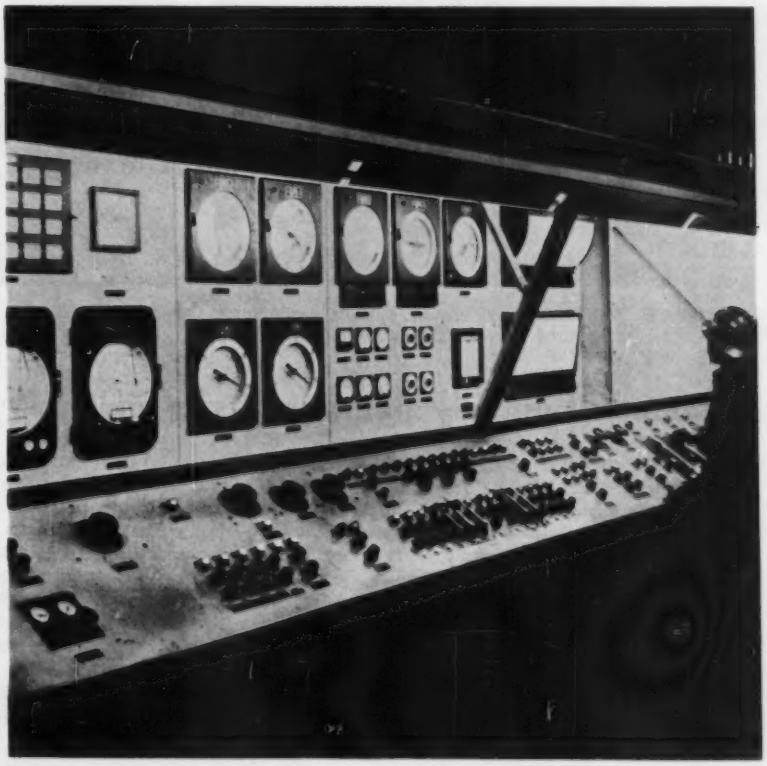
"In the ion exchange plant, instrumentation is employed to maintain and meter solution flows and to ratio water to acid in the elution cycle. At this plant in the precipitation cycle, pH is used to control the precipitation of gypsum and ferric hydroxide by automatically maintaining a pH of 3.3 to 3.6 by controlling ammonia addition. Final precipitation of yellow-cake is automatically controlled by controlling the ammonia addition to maintain a final pH of 6.8 to 7.0."



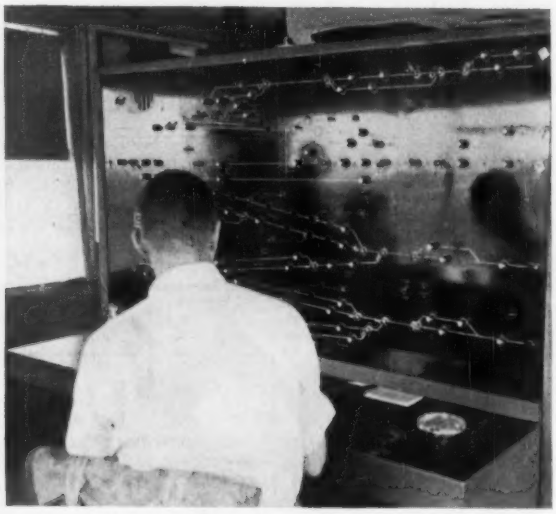
Automatic Weighing At J&L Sinter Plant

AN AUTOMATIC weighing system electrically weighs and controls the amount of materials feeding Jones & Laughlin Steel Corp.'s new 2,500 ton-per-day sintering plant at their Cleveland, Ohio, works. The Trans-Weigh Co. unit above shows the materials which are fed to the sinter plant and the point at which each control unit is installed in the system. The operating instrument and control board is shown at right. The Trans-Weigh system measures instantaneous flow of material on a conveyor by determining the weight of the material on a short section of the belt together with belt speed. Major components of the system are an electric tachometer generator, detecting belt speed, an electric strain gage load cell which measures belt load, and a specially modified electronic potentiometer which indicates and records instantaneous flow in tons per hour. The unit works automatically or with manual controls.

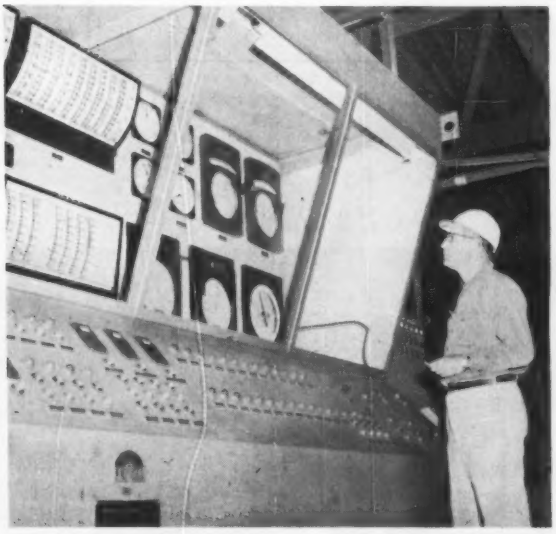
J&L's $7-million sinter plant has been processing iron ore fines into large-size particles since November 1957.



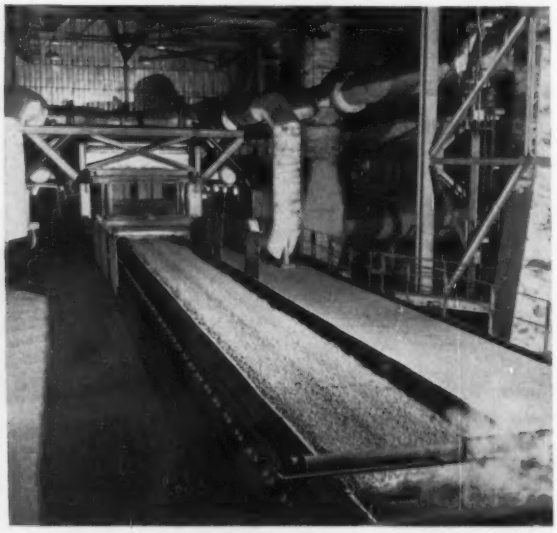
MOVEMENT of ore and waste trains at Kennecott's Chino pit is controlled by operator at right.



CENTRALIZED traffic control equipment is installed in booth overlooking the open pit.



ELABORATE SYSTEM of meters, instruments and controls are required for pelletizing at right.



PELLETIZING MACHINE is 6 ft wide and 168 ft long. It hardens pellets at the rate of 90 to 110 tons per hour.

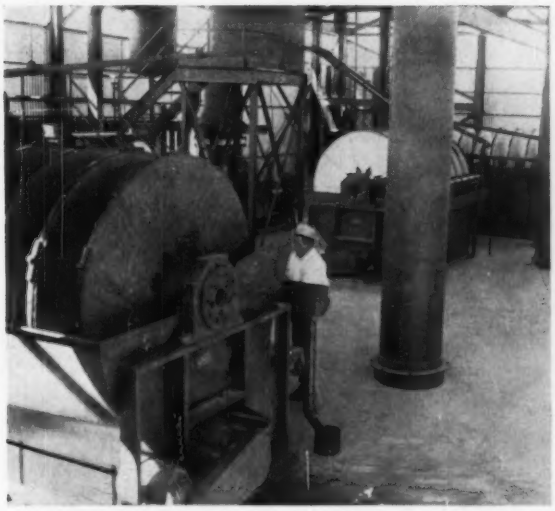
Automatic Controls Maintain High-Quality Pellet Output

THE FOLLOWING SEQUENCE of operations on the pelletizing machine of Reserve Mining Co. at Silver Bay, Minn., is governed by an elaborate system of meters, instruments and controls: 1. Updraft drying. 2. First down-draft heating. 3. Second down-draft heating. 4. Ignition. 5. Burning. 6. Recuperation. 7. First cooling stage. 8. Second cooling stage.

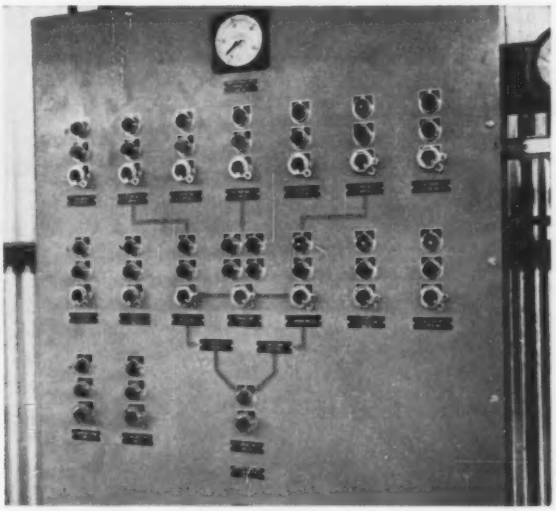
In this process, heat which is generated by the combustion of the coal and oil is carefully conserved and recycled to the various addition points listed above. Pellets then go through a bar grizzly where oversize clusters (plus 4-in.) are fed to rolls to join the undersize to be quenched.

After the pellets have been quenched, they are deposited on two 48-in. conveyor belts, 660 ft long which convey them to the loading and storage areas at the rate of 1,550 long tons per hour.

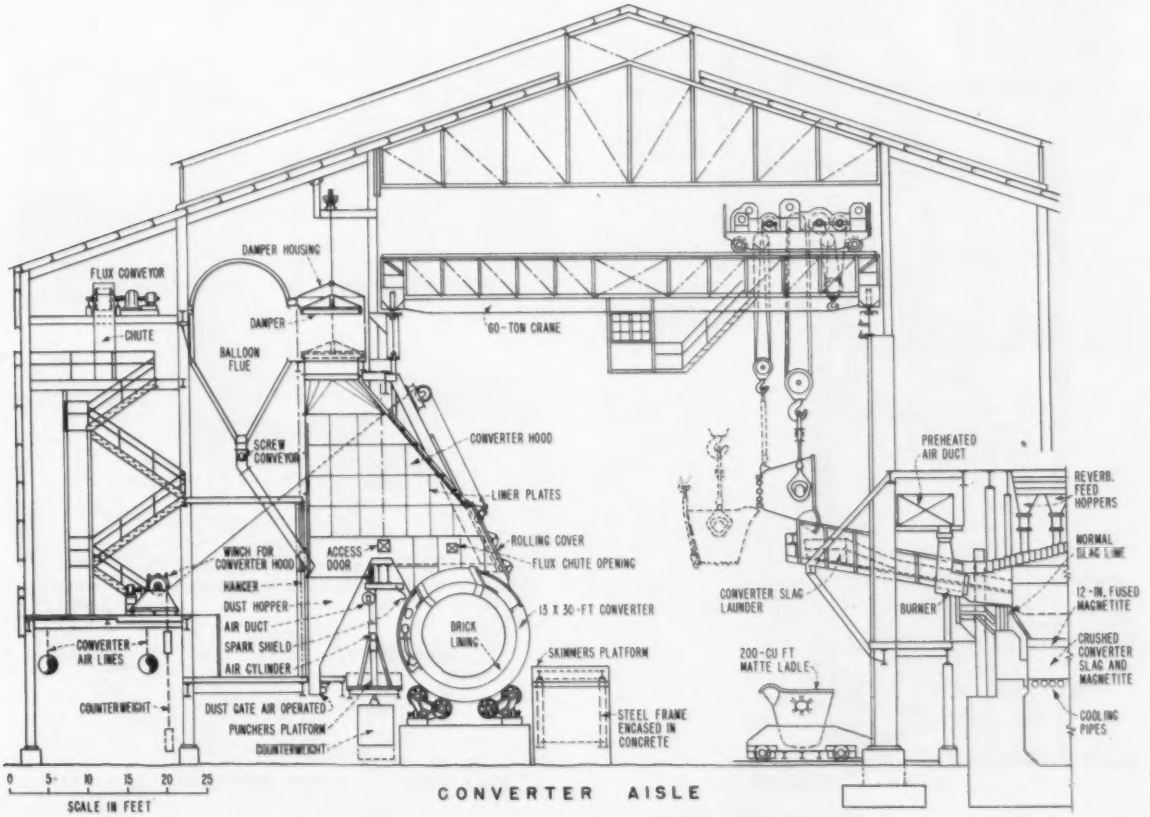
Extensive materials-handling and stockpiling equipment are installed at the Silver Bay plant (see aerial photo p 117) to facilitate storage or shipment of the pellets after production. During shipping months, the pellets are conveyed to a headhouse near the quay where the pellets can be diverted from a tripper belt to 6,000-ton storage bins or to stockpile. When boats are anchored at the dockside, pellets are drawn from within the bins and fed to two boat loaders which discharge into holds of the ship. *E&MJ*, December 1956, pp 75-102.



CONCENTRATE FILTERS at San Manuel Copper Co.'s modern plant are controlled from instrument panel at right.

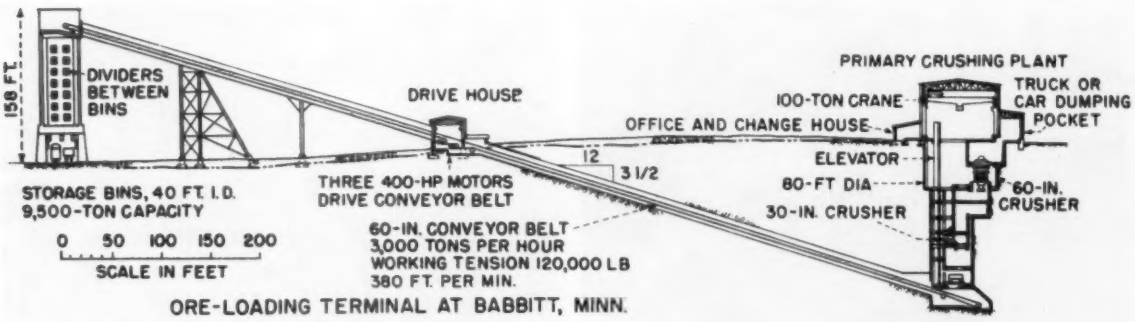


CENTRAL CONTROL PANEL governs operation of filter feed, pumps, compressed air and auxiliary equipment.

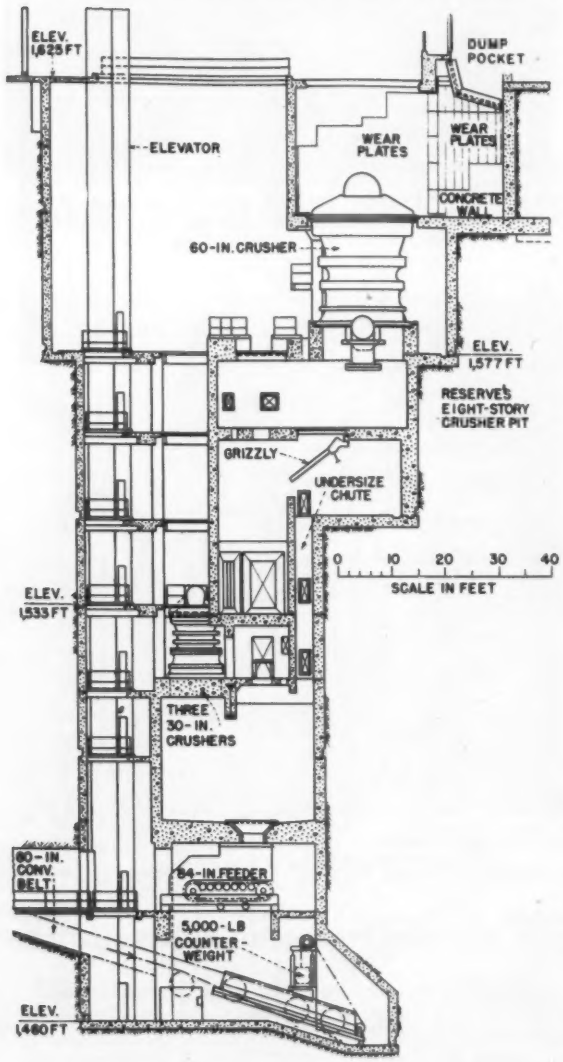


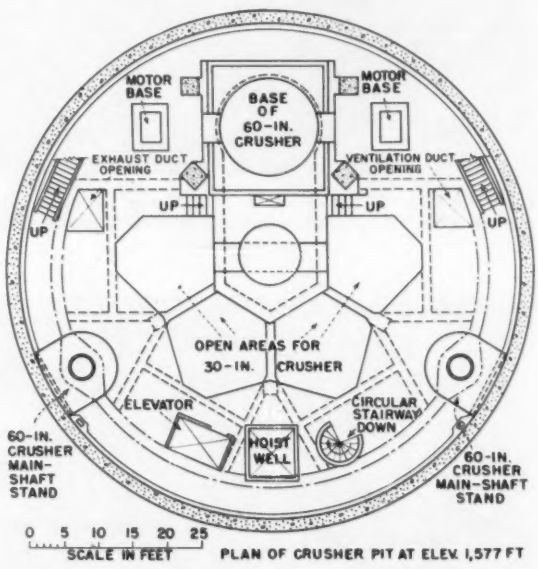
Cross-Section Through a Modern Copper Smelter

DETAILS SHOWN in this cross-section of the converter aisle of San Manuel's new copper smelter indicate the importance of materials handling and dust and fume control equipment in modern plant design. Equipment in various parts of the smelter is controlled from enclosed push-button centers. Provision for a liberal amount of headroom, not only in the smelter, but in the concentrator and other plants of the project, contributes to greater worker comfort and safety. "San Manuel—America's Newest Large Copper Producer." *E&MJ*, April 1956.

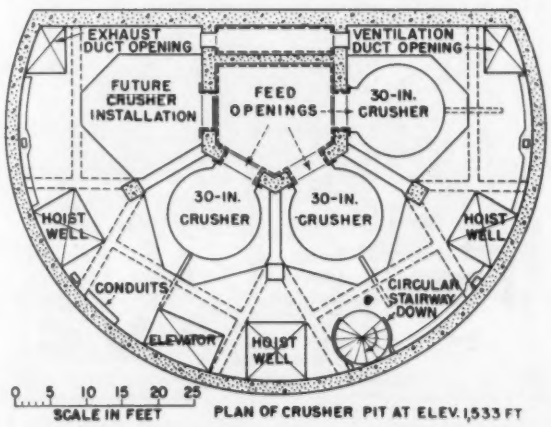


ORE-LOADING TERMINAL AT BABBITT, MINN.





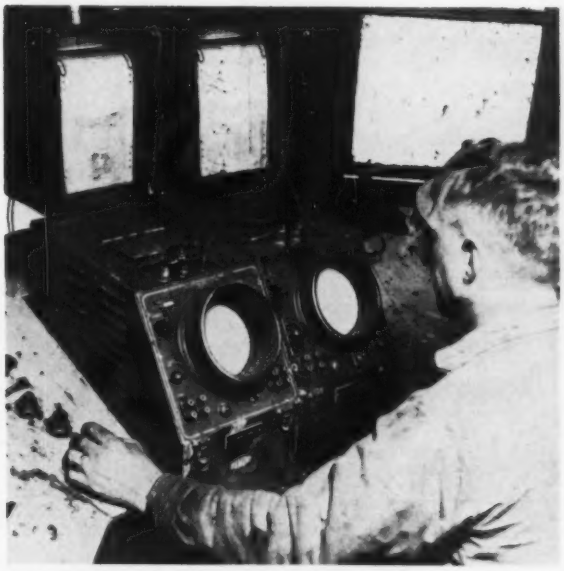
PLAN OF CRUSHER PIT AT ELEV. 1,577 FT



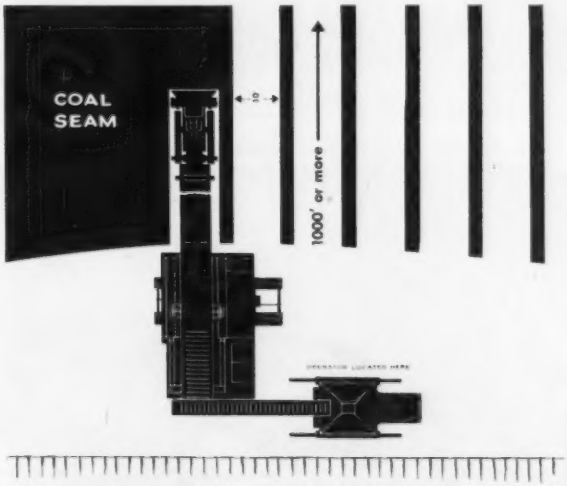
PLAN OF CRUSHER PIT AT ELEV. 1,533 FT

Eight-Story Pit Houses World's Largest Crusher

RESERVE MINING CO.'s 60-in. crusher at Babbitt, Minn., is installed in a concrete-lined pit served by an eight-story elevator. Capacity of the crusher is 3,500 long tons per hour. Sections through the crusher well, shown above, indicate the elaborate attention given to ventilation and dust control, materials handling and transport of men and material to service the crusher. Note the three 30-in. secondary crushers installed below the primary, also the provision of space for an additional unit if required for future expansion. Crushed ore is carried to storage bins on a steel-reinforced 60-in. belt conveyor. Working tension of the belt is 120,000 lb. *E&MJ*, December 1957.



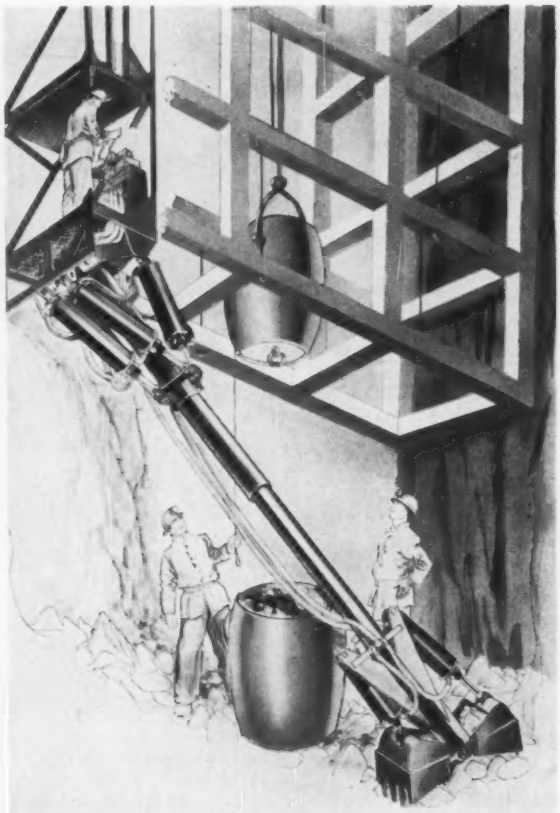
MAN AT CONTROLS operates the remote continuous mining machine shown below. Unit will travel 1,000 ft or more.



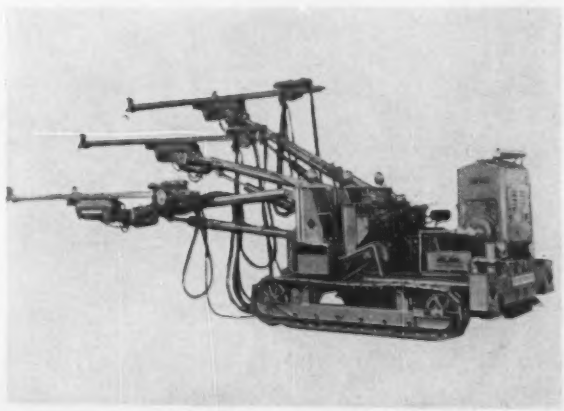
AUTOMATIC MINING MACHINE mines the coal and loads it onto a conveyor which carries coal to discharge station.

Mining by Remote Control

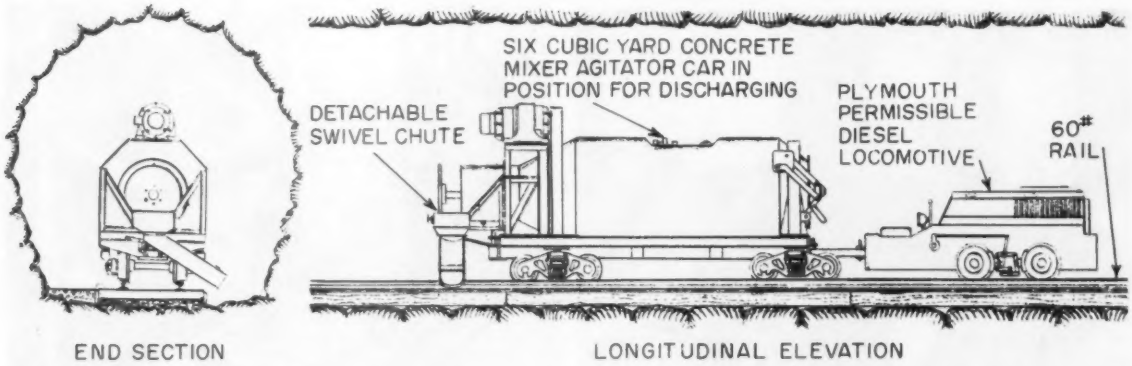
A MINING SYSTEM permitting men to mine coal without going underground was announced recently by Joy Manufacturing Co. which acquired the rights to manufacture, use, lease and sell the remotely controlled continuous mining system shown in the two illustrations above. Peabody Coal Co., largest strip mining company in the world, has operated units made by Union Carbide, in three of their mines successfully for several months. It is expected that these machines will be used to mine coal and other minerals underground in five to ten years. A prototype of the machine has proven capable of advancing an entry at a rate of more than 100 ft an hour. The mining machine automatically loads coal onto a heavy-duty continuous transport system that follows the machine into the mine and delivers coal to an outside discharge station. This especially rugged transportation system is designed to operate in areas where local roof falls may occur. Over five year of prototype operation has already been experienced.



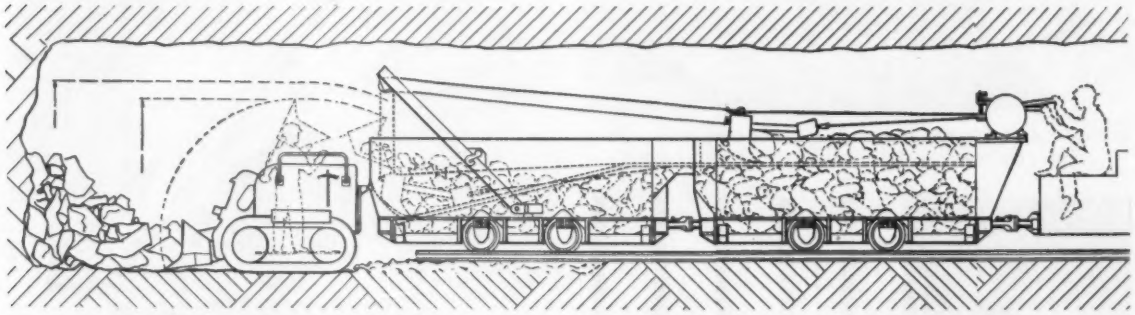
CRYDERMAN MUCKER with positive telescopic boom eliminates arduous hand loading in vertical and incline shafts. Fingertip controls guide the digging unit to all corners of the shaft. Recently a new square shaft-sinking skip has been designed to work with the Cryderman mucker.



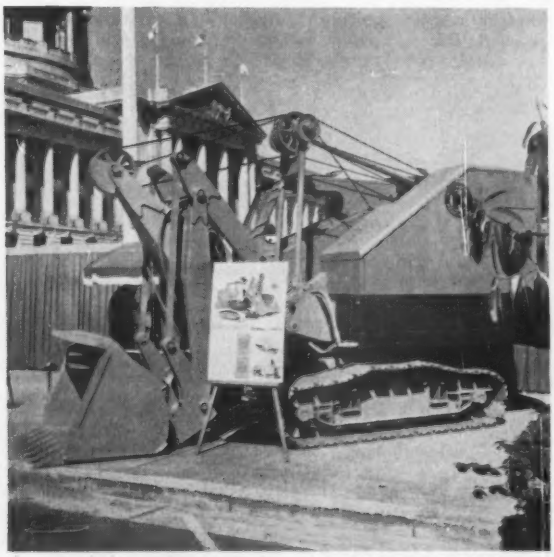
FINGER-TIP CONTROLS on this three-machine Mobiljumbo make drift and crosscut drilling virtually an automatic operation. Gardner Denver Co. units.



GROUND STABILIZATION with concrete can be speeded up with this 6-cubic yd batch mixing car designed to operate in transit in tunnels. Model was built for tunnel driving project by Moran Engineering, Southgate, California.

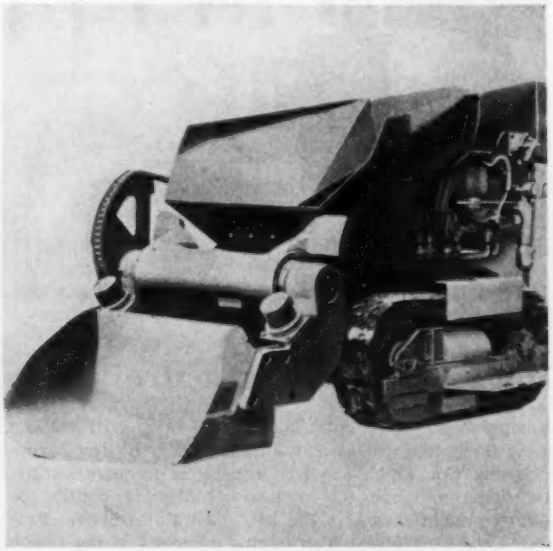


SLUSHER TRAIN equipment includes loader, slusher-train and locomotive. The train consists of automatic bottom-dump cars. Purpose of unit is to eliminate switching in tunnels. Sanford-Day Iron Works, Inc., Knoxville, Tennessee.



High-Capacity Shovel Scooper

THIS NEW UNIT, demonstrated at the recent Mining Congress Equipment Show combines the features of the power shovel and the front end loader. Dumping clearance is 9 ft 3 in. to 9 ft 11 in. Capacity of buckets varies from 1⅞ to 2½ cu yd. Koehring Co.



Overcast Loader-Conveyor

COMBINATION loader and conveyor has a storage bin capacity for about 30 cu ft of material. Loading capacity of the unit is 50 to 80 cu ft per min, depending upon bucket size. Three 12-hp and one 7.5-hp air motors power the loader. Model 635. Eimco Corp.

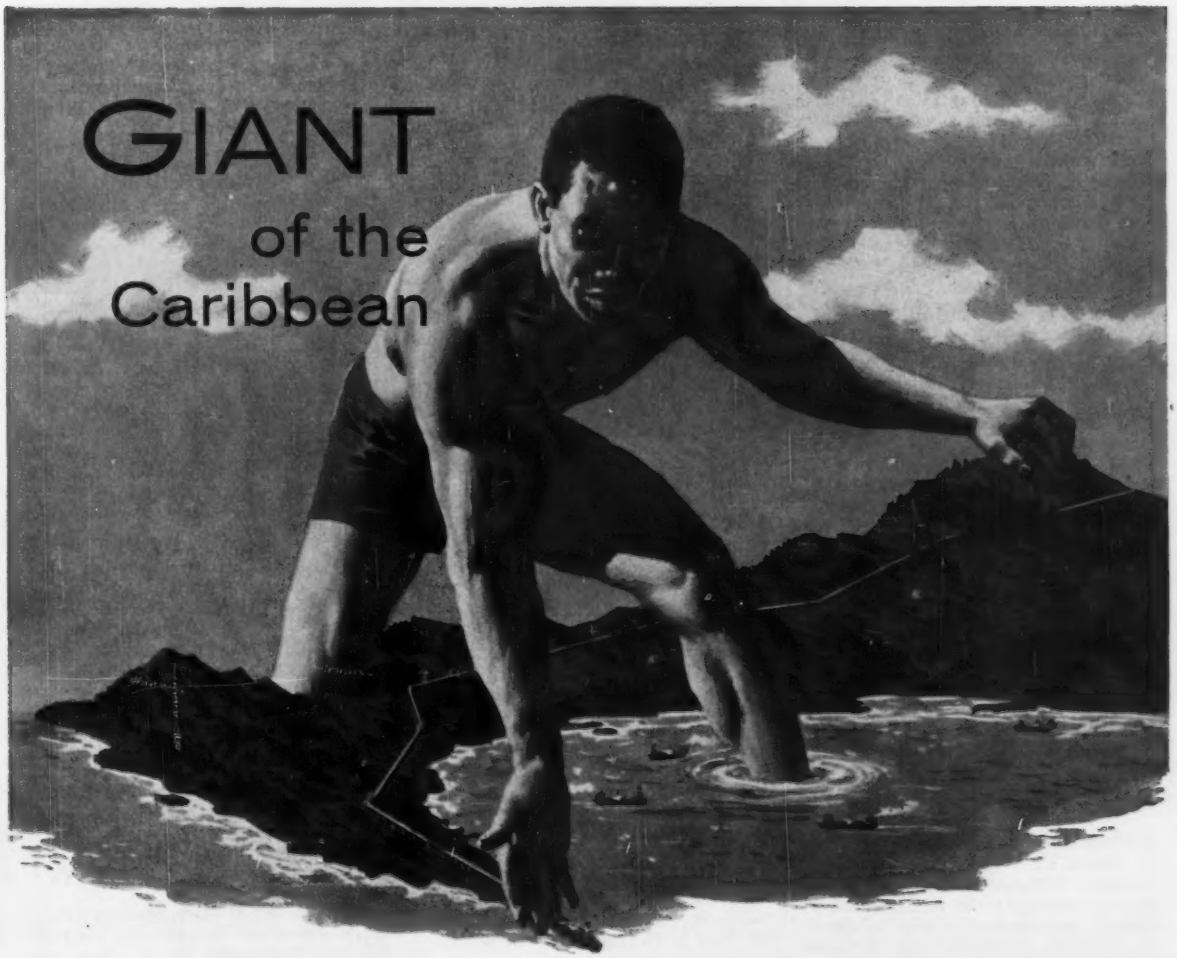
ERIE MINING CO.'S Taconite Harbor installation is designed to ship some 7.5-million tons of pellets annually via the Great Lakes. Ships will be loaded from multiple conveyors. Two ships can be loaded at a time.

RESERVE MINING CO.'S Silver Bay project includes crushing plant concentrator, pelletizing plant, power plant and dockside loading facilities. Huge stockpile areas are required to permit operation during non-shipping season. Provisions have been made in the plant layout to double the present capacity to meet possible future requirements.

San Manuel's Model Townsite and Plant

ELEMENTS of good modern design are shown in the aerial view of the townsite, concentrator and smelter of the San Manuel Copper Corp. at San Manuel, Arizona. The townsite includes a hospital, schools, shopping center, pool and recreation areas. The plant layout provides for a smooth flow-through of ore from the bins at the railroad to the crushing plant and concentrator. Capacity of the plant is 30,000 tons per day. Other plants included in the layout are a lime plant, molybdenum plant, power plant and flux and reagent storage areas. The plant was designed and constructed by the Stearns-Roger Manufacturing Co. and Utah Construction Co. *E&MJ*, April 1956.

US RUBBER CONVEYOR BELTS



In Jamaica, B.W.I., moving a million and a half tons of bauxite a year from back up in the hills to port loading facilities is a tough, complicated job. Climate, rough terrain, abrasion, great distances—all have to be overcome. Reynolds Metals Co. moves its bauxite production underground and overland on dozens of "U.S." Belts... first as cold, sticky, abrasive run-of-mine ore, later as crushed fines right from red-hot drying kilns.

"U.S." belting engineers, working closely with engineers of the conveyor system and of Reynolds, selected and designed the belts to handle the many different problems of movement and material. It's this specialized belting "know-how", plus the finest product available, that assures you of the right belt for the job every time.

When you think of rubber, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

NEW BOOKS

Progress in Mineral Dressing—Transactions of the International Mineral Dressing Congress, Stockholm, 1957. Sponsored and edited by Svenska Gruvforeningen and Jernkontoret. Excellent, well done. Contains all the papers presented at Stockholm meeting in 1957, plus the contributions to the discussion and author's replies. The committee is to be congratulated for a job well done. Comminution, magnetic separation, roasting, sintering, flotation theory, flotation practice and mineral processing are covered. Illustrated and indexed in 754 pp. May be obtained from Almqvist & Wiksell, 26 Gamla Brogatan, Stockholm C, Sweden. Price Swedish Kroner—95 or U.S. $15.

Saudi Arabia (third edition), by K. S. Twitchell, American mining engineer who formed the Saudi Arabian Mining Syndicate Ltd., and was its consultant until the syndicate was liquidated in 1954. Packed with information on the kingdom of Saudi Arabia, its background, and its present significance in the Mid East. Published by Princeton University Press, Princeton, N.J. Illustrated in 268 pp. Price $5.

The Earth and Its Gravity Field, by W. A. Heiskanen and F. A. Venig Meinesz. New conclusions about the way the earth tends toward equilibrium. For the professional, both academic and practical, and the graduate student in the fields of geophysics, geodetics, geology, etc. Published by McGraw-Hill Book Co., 330 West 42 St., New York 36, N.Y. Illustrated in 453 pp. Price $12.50.

Stoichiometry for Chemical Engineers, by Edwin T. Williams and R. Curtis Johnson. Designed for the beginning student, presenting the fundamentals of material and energy balance in chemical reactions. Published by McGraw-Hill Book Co., 330 West 42 St., New York 36, N.Y. 345 pp. Price $8.

How to Become a Professional Engineer, by John Constance. Step-by-step instruction on preparing for and becoming a professional licensed engineer. Thorough. Published by McGraw-Hill Book Co., 330 West 42 St., New York 36, N. Y. 261 pp. Price $5.50.

Separation and Purification of Materials, by Rolt Hammond. Elementary. Covers these mineral processing steps—solids separation, liquid-solid separation, solid-gas separation and distillation. Also includes centrifugation and separation and purification processes in nuclear energy field. Published by Philosophical Library Inc., 15 East 40 St., New York 16, N.Y. 320 pp. Price $10.

Modern Chemical Processes, Vol. 5. A series of articles describing chemical manufacturing plant operations, prepared by the editors of Industrial & Engineering Chemistry. Contains articles on elemental phosphorus, tantalum, gold, uranium, boron chemicals, plus several petrochemical and purely chemical articles. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N.Y. Well illustrated in 149 pp. Price $5.

Fluid Dynamics and Heat Transfer, by James G. Knudsen and Donald L. Katz. A one-semester text for graduates, bridging the gap betwen fluid flow and heat transfer theory. Published by McGraw-Hill Book Co., 330 West 42 St., New York 36, N.Y. 566 pp. Price $12.50.

Dispersion of Materials, by Rolt Hammond. Very general; introductory. More mineral processing unit operations—crushing and grinding, classification, flotation, dispersion of liquids, gases, and air and gas cleaning. Published by Philosophical Library Inc., 15 East 40 St., New York 16, N.Y. 223 pp. Price $10.

Pre-Stressed Concrete—Theory and Design, by R. H. Evans and E. W. Bennett. Analysis and design of simple supported beams, and special applications and structures. Published by John Wiley & Sons Inc., 440 Fourth Ave., New York 16, N.Y. 290 pp. Price $10.

BOOKS PRESENTED on this page may be obtained direct from the publisher listed with each item. E&MJ does not sell or offer these items unless specifically noted.

Canadian Mines Handbook—1958 is just off the press, according to John W. Carrington, editor, *Northern Miner*. More than 8,200 Canadian mining companies are tabulated, with 225 being new enterprises. Eight-year range of mining share prices and a map section are included. May be obtained from Northern Miner Press Ltd., 16 Richmond St., West, Toronto 1, Ont. 324 pp. Price is $3 (paper bound).

Reports and Pamphlets

Catalog of the Mineral Localities of South Carolina, by Earle Sloan. Reprinting of Sloan's 1908 report. Old and thorough. Maps and text in 505 pp. Published by Division of Geology, State Development Board, Columbia, S. C.

Identification Tables for Uranium and Thorium Minerals, by A. Volborth. Reprinted from Economic Geology, by Nevada Bureau of Mines, Reno, Nev. 9 pp.

Geology of Hart County, Georgia, by Willard H. Grant, as Geological Survey Bulletin No. 67, State of Georgia. Illustrations, text and maps. Published by Georgia State Division of Conservation, Dept. of Mines, Mining and Geology, Atlanta, Ga. 72pp.

The Troughing Belt Conveyor-Elevator, by A. W. Jenike, P. J. Elsey and R. H. Woolley, as Bulletin No. 92 of the Utah Engineering Experiment Station, University of Utah, Salt Lake City. Text and illustrations in 20 pp.

Selling to the AEC. A revised pamphlet showing the purchasing program organization, directory of purchasing officers, list of products purchased, and information on Atomics for Peace program. May be obtained from Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C. 34 pp. Price 25c.

Maine Metal Mines and Prospects, Mineral Resources Index No. 3, State of Maine, by John R. Rand. Maps and 53 pp. Published by Dept. of Economic Development, Augusta, Me. Price 88c.

Scenic Trips to the Geologic Past, No. 3, Roswell-Capitan-Ruidoso and Bottomless Lakes Park, New Mexico, by John E. Allen and Frank E. Kottloski. Step-by-step, mile-by-mile guide to interesting rock formations, mineral deposits and specimen locations. For the general public. Fine to have along if you can make the trip. Published by State Bureau of Mines and Mineral Resources, Socorro, N. M. Maps, illustrations and text in 47 pp.

Geology of the Werner Lake-Rex Lake Area, by H. D. Carlson is contained in Ontario Dept. of Mines Vol. LXVI, Part 4. Maps and 27 pp. Available from the Dept. of Mines, Toronto, Ont.

Gypsum and Anhydrite, by A. W. Groves. All pertinent data concerning the properties, occurrence, mining, preparation and use of these two minerals are discussed. Discovery of enormous reserves in British Somaliland is mentioned. Published by Overseas Geological Surveys, Mineral Resources Division, Commonwealth Institute Building, London, S. W. 7, Eng. 110 pp. Price 8s 2d.

Potosi Tungsten District, Madison County, Montana, by Theodore H. Eyde as Information Circular No. 21. Map and text. Published by Montana Bureau of Mines & Geology, Room 203-B, Main Hall, Montana School of Mines, Butte, Mont.

Geology of the Cerrillos Area, Santa Fe County, New Mexico, by Alan E. Disbrow and Walter C. Stoll as Bulletin No. 48, New Mexico Bureau of Mines in cooperation with the U.S. Geological Survey. Diagrams, text and maps. Published by the New Mexico Bureau of Mines & Mineral Resources, Socorro, N. M. 73pp.

Geology of the Central Peloncillo Mountains, Hidalgo County, New Mexico and Cochise County, Arizona, by Elliot Gillerman as Bulletin No. 37. Text and maps. Published by New Mexico Bureau of Mines & Mineral Resources, Socorro, N. M. 152pp.

Petrography, Mineralogy and Origin of Phosphate Pellets in the Phosphoria Formation, by G. Donald Emigh as Pamphlet No. 114. Text and illustrations. Published by Idaho Bureau of Mines & Geology, Moscow, Idaho. 60pp.

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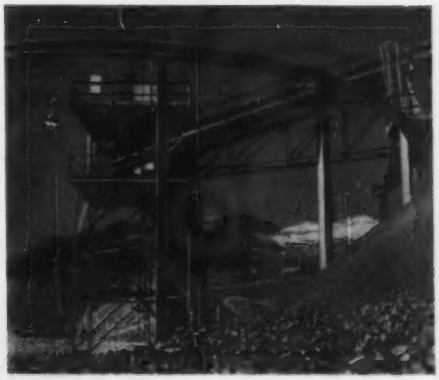

Pendulum ore conveyor—Ingenuity produced KE innovation distributing beneficiated iron ore in 180° crescent; conserved space, cut rehandling costs.

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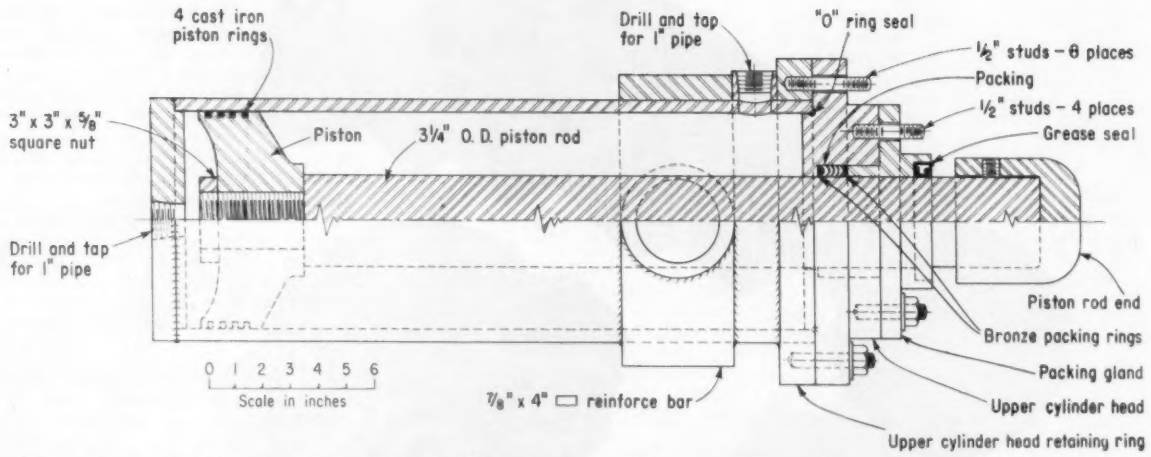
OPERATING IDEAS


4 cast iron piston rings
Drill and tap for 1" pipe
"O" ring seal
½" studs – 6 places
Packing
½" studs – 4 places
Grease seal
3" x 3" x 5/8" square nut
Piston
3¼" O. D. piston rod
Drill and tap for 1" pipe
Piston rod end
Bronze packing rings
Packing gland
Upper cylinder head
Upper cylinder head retaining ring
0 1 2 3 4 5 6
Scale in inches
7/8" x 4" ▭ reinforce bar

Booster Cylinders Reduce Excessive Strain During Dumping Cycle

ASSIST CYLINDERS on 25-ton haulage trucks operating in the Lavender Pit of Phelps Dodge Corp., Copper Queen Branch, Bisbee, Ariz., have resulted in smoother elevation of the 18-cubic-yd-capacity dump body with consequent reduction in repairs and maintenance.

To elevate a fully loaded dump body, about 2,000 psi pressure is required. This thrust results in bent piston rods, failure of the sub-frame and back end of hydraulic cylinders. Assist cylinders reduce initial pressure to 450 psi.

The cylinders are 7¾-in. bore and 18-in. stroke, pivoting in trunnion bearings mounted in a bracket welded to each side of the truck frame near the front end of the dump body. Upper ends of the pistons have rounded knobs which act on a 2-in. plate welded to the underside of the dump bed to take the vertical thrust.

Assist cylinders are connected to the same hydraulic system serving the main dump cylinders. After starting the dumping lift with 450 psi for the elevation limited by the 18-in. stroke, the main cylinders pick up the full load and require 1,300 psi momentarily or for about 7.5 sec, after which the load decreases rapidly—maximum angle is reached.

Mobile Boom Eases Bench Lining

GREATLY IMPROVED AND MODERNIZED tower lining operations have been gotten at Kennecott Copper's open pit workings by using a long-necked crane mounted on a tractor.

The roustabout crane with a 30-ft boom (called "Sputnik" because it was mobilized when the Russian rocket was fired) came into being as a result of a study which evaluated the practicability of using tractor cranes in place of the locomotive cranes for lining bench towers.

The March issue of the company magazine, *Kennescope*, stated that "in the past, lining bench towers in conjunction with routine track lining on the mine levels consumed approximately 1.6 locomotive crane shifts per day. This involved the use of one crane nearly full time, plus an additional crane as was required by the daily work load."

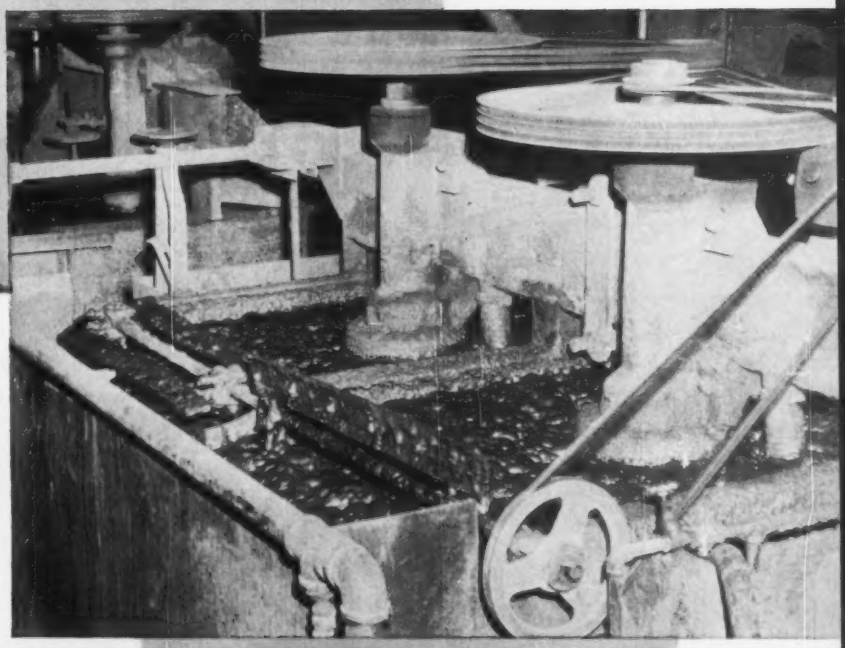
With locomotive cranes, the process involved: 1) having an electrician perched on boom end, unclip the wire and have it moved by hand to the newly laid track; and 2) moving the tower and positioning it at the new track.

Kennecott tried using more maneuverable rubber-mounted equipment. These failed—equipment had neither sufficient boom length nor lifting capacity to swing towers without backing up, turning and moving to a new position.

The accepted "Sputnik" is strong, center-mounted, and swings in a 135 deg arc on either side of front center. All crane motions can be worked separately or simultaneously.

DENVER TYPE "M" FLOTATION

Helps Improve Mill Metallurgy by 18% at IRON KING MILL of Shattuck Denn Mining Corp.



Installation of a 2-cell DENVER Type "M" Flotation Machine has played an important part in the increased metallurgical efficiency of the Shattuck Denn Iron King Mill at Humboldt, Arizona. On the basis of a metallurgical efficiency index established by Shattuck Denn 18% improvement has been attained during the past two years.

See For Yourself In Your Own Mill AT NO RISK What a DENVER Type "M" Flotation Machine Will Do For You

DENVER TYPE "M" FLOTATION

If you want added recovery take advantage of this opportunity!

Install a 2-cell DENVER Type "M" Flotation at the end of your present flotation circuit. If the DENVER Type "M" Flotation Machine fails to pay for itself by recovering minerals otherwise lost in tailings, return the machine to us and it will cost you nothing except the transportation and installation. The DENVER Type "M" is a self-contained unit ready to connect to your tailings line.

Please write or telephone us the details of your circuit so we can send you our recommendations without delay.

This offer must, of necessity, be limited. We urge you to act promptly. Our telephone number in Denver is CHerry 4-4466.

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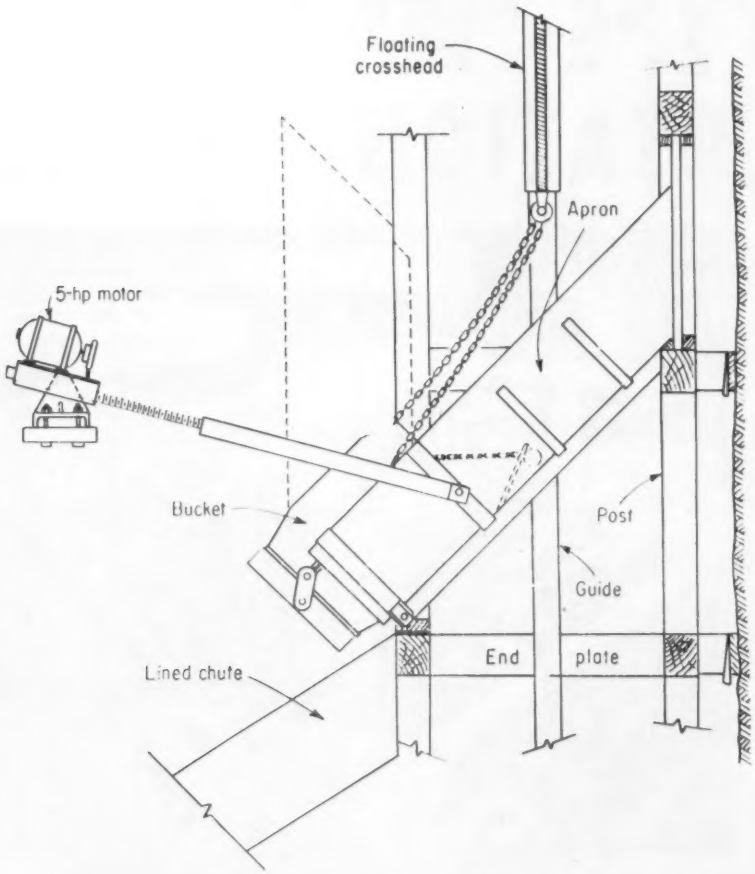
DENVER EQUIPMENT COMPANY

OPERATING IDEAS *(Continued)*



Intermediate Station Speeds Shaft-Sinking

DURING SHAFT-SINKING operations which carried their three-compartment Crescent shaft from the 1275 level to the 3275, Bunker Hill ran into the problem of hoisting. They came up with a workable scheme—intermediate hoisting pockets.

The 250-hp hoist available at the Crescent had a hoisting speed of 800 fpm. This was considered too slow for hoisting broken rock from the shaft bottom to the surface in one lift. Adoption of this procedure would have meant an unbalanced sinking cycle (overly long hoisting period), affecting the overall sinking speed. The only corrective measure, ruling out a speedier hoist, was to hoist broken material in two lifts—namely, (1) in sinking buckets to an intermediate pocket dump station established not higher than 1275 ft above the bottom of the shaft, and (2) from the intermediate pocket dump station in skips to the surface. A temporary bulkhead of lagging was placed across one hoisting compartment about four sets below the pocket chute lip, and the manway was lagged off from the loading pocket to the bulkhead to protect the men working in the bottom of the shaft.

The pocket dump station setup was just what was needed, and its use made possible a daily advance of 8.4 ft. The first intermediate pocket dump was installed on the 2000-ft level after the shaft had passed the 2100-ft mark.

Each shaft pocket was equipped with two semicircular steel aprons, one in each hoisting compartment. The aprons were fastened at the bottom with a hinge and lowered across the shaft or raised up into clear position by a motor-operated screw mechanism. Limit switches were installed on both sides of the screw mechanism to stop the aprons automatically when correct positions had been reached. These in turn were controlled by an operator through conveniently placed switches.

The device for dumping the loaded sinking bucket consisted of a V-slot arrangement in the bottom of the apron. The loaded sinking bucket with its iron ball suspended on a 3-ft chain was hoisted to a point above the pocket apron and the apron lowered into position across the shaft. As the bucket was lowered, the ball hooked into the V-slot, causing the bucket to turn over and dump its load into the pocket. The bucket was then raised and as it cleared the apron, the ball became disengaged. Finally, the apron was pulled clear and the bucket returned to shaft botom.

The complete dumping operation required about 20 sec, during which time another bucket was being filled.

Lead-Lined Scrubber Pinpoints Leakage

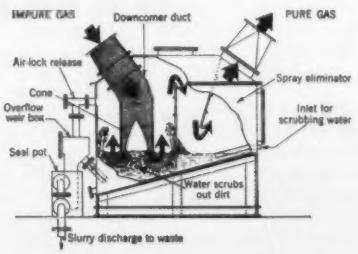
IN SEEKING a more effiecient recovery of dust from process gases, Consolidated Mining & Smelting Co. of Canada, Ltd. developed a new lead-constructed, wet-impingement scrubber.

In a recent edition of *Lead*, the Lead Industries Assoc. said that the unit (Doyle scrubber) utilizes principles of wet-impingement collection at relatively high gas velocities with high recovery and low installation and maintenance costs.

Gas velocity is increased by the annular gap provided by the placement of a streamlined cone at the downcomer duct bottom. Desired impingement velocities are obtained by use of cones of appropriate base diameters or by installing an adjustable cone.

The *Lead* article stated that the advantages of lead-on-steel-cage scrubber construction are these: (1) lead performs effectively in contact with variable concentrations of process gases and solutions; (2) if needed, extra support could be given from the outside—with avoidance of internal strapping and the necessity for piercing the sheets; (3) there is lower material and erection costs and easier construction through the elimination of unwieldy steel sheets; and (4) it permits immediate location of any leak and easy accessibility for repair.

Scrubber's operating requirements include: (1) Power—2.2 to 3.0 hp per 1,000 cfm of gas; (2) Scrubbing Liquid —2 gal water per 1,000 cubic ft of gas. In some applications, the rate is as low



as 0.5 gal per 1,000 cubic ft of gas—discharged to settling tanks for recovery of solids. Liquid is returned to scrubbing system: (3) Impingement Velocities—90 to 240 ft per sec, usually 150 ft per sec; (4) Inlet Gas Volume—6,000 cfm at 30 deg C; (5) Outlet Dust Burden—0.1 mg per cubic ft; and (6) Draft Across Scrubber—10-in. wg.

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every day, every year more and more mine cars and locomotives are equipped with

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NACO
STEEL WHEELS

WILLISON
AUTOMATIC COUPLERS

OPERATING IDEAS *(Continued)*

WATERPROOF BAG prevents oil leakage and helps to insure proper mixing ratio.

UNCOATED AN (at right) soaks up oil better, improving mix and easing handling.

MORE SENSITIVE MIX can be triggered by one strand of heavy Primacord.

One Strand of Detonating Fuse Can Set Off AN Blast

A NEW TYPE AMMONIUM NITRATE, which eliminates the need for dynamite in field-compounded explosives, has been announced by the Spencer Chemical Co. Spencer calls it "N-IV" and says that it differs from the standard currently used fertilizer grade in that it is basically an uncoated material with a special surface treatment that eliminates caking and improves prill structure.

The "N-IV" is being packaged in a waterproof, heavy-wall polyethylene plastic bag which Spencer recently introduced for fertilizer and polyethylene resin.

The success of blasting without using the customary dynamite trigger lies in more intimate, complete and positive mixing of the 94/6% AN-oil mix. Charles M. Cooley, sales supervisor, industrial ammonium nitrate, stated that "now, a single line of 150 to 180-grain detonating fuse is the only initiator normally needed to establish conditions required for first-order detonation. No longer is it necessary for a 5- to 25% detonating charge or complicated methods such as small explosive units to be attached to a line of 50-grain cord. This means that the cost of ammonium nitrate has been reduced.

Without inert ingredients—usually 2 to 4% of the total—the "N-IV" material is 100% ammonium nitrate by weight. According to the company, this means that less material will be required to do the same blasting job. A blast hole, for instance, which normally required 200 lb of AN can be detonated with equal results by using 192 lb of the new material.

The waterproof sack can help to eliminate storage problems by being able to be stored out in the open without damage to its contents. Since it is a common practice to add oil directly to the ammonium nitrate in the bag and then store it, Spencer says the plastic bag can simplify mixing, offer greater cleanliness and easier handling than was previously possible with paper bags. In addition, storage is simplified since the oil can be added through a small opening in the top of the bag which can then be sealed with tape, allowing the bags to be stacked in the usual manner.

Chemical Injections Ease Tunneling Through Wet, Sandy Material

INJECTED SOLUTIONS of sodium silicate and calcium chloride have eased many of the problems of tunneling through sandy, water-saturated material.

"The process", according to the Bureau of Mines Information Circular 7846, "consists of consecutive injection of two solutions, which will instantly bring about precipitation of silicic gel . . . to coat the individual sand particles with a thin film having high surface tension. Excess water is pushed beyond the solidifying range owing to additional pressure as cementation continues."

The Bureau reported that a 22-ft bed of water-saturated, fine grain sand halted driving operations on a tunnel designed to house an ore-conveyor belt at Pickands Mather Co.'s Tioga No. 2 mine near Grand Rapids, Minn. The tunnel was being driven from both ends but work stopped when the sand layer was reached. Heavy pressures deformed the steel-supporting rings at upper face, and there was an inrush of mud at lower face.

"Solutions of sodium silicate and calcium chloride were prepared at the tunnel entrance. Compressed-air pumps, attached to the suction tanks, forced the solutions to the tunnel heading through 1-in. lines. The injection pipes were made from A-section diamond-drill rods. A special spear-shaped driving head was used with the driving rods. Driving was accomplished with pneumatic hammers, and hydraulic jacks withdrew the pipe.

"Three series of pipes were driven at the face . . . one series around the circumference of the tunnel just back of the existing face to a depth of 3 ft. A second series was driven ahead of the face and flared to the sides . . . and a third series was driven ahead of the tunnel and in the line of advance to a distance of 8 ft. This pattern gave a solidified area large enough to permit a safe tunnel advance of 6 to 10 ft with a 2 ft thickness of firm ground left in the face.

"The material was excavated easily with the pneumatic clay spades, and no blasting was necessary. Stabilization and excavation were repeated until the quicksand area was passed and normal tunneling was resumed."

Correction—Soft Wood Plug

Dear Sir,

My attention has been drawn to an item on p 114 of your issue for July 1958, entitled "Soft Wood Plug Eases Blasting." The sentence reading, "soft wood plugs were tested at Anglo-Transvaal Consolidated Investment Co., Ltd., where they were compared with sand and clay plugs," implies that Anglo-Transvaal Consolidated Inv. Co., Ltd., is either interested in the sale or promotion of soft wood plugs or has enjoyed favorable experience of their use. I would ask you to specifically withdraw that implication.

Yours faithfully,
Patrick L. Gooderham,
Public Relations Officer,
Anglo-Transvaal Consolidated
Inv. Co., Ltd.

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B.F.Goodrich tires give miner 25% more mileage than other makes!

WINTON Coal Mining Company works the strip mines in and around Tamaqua and Coaldale, Pa. Eighteen dump trucks haul tons of coal 15 miles over winding, mountainous roads. Low tire mileage and premature failures were problems for Winton until the company switched to B.F.Goodrich tires. Result: tire failures way down, mileage up as much as 25% over other makes—even two retreads.

Winton uses the Rock Logger tread which, like the new Rock Service, Universal and other B.F.Goodrich tires for mine work, is specially compounded to resist rock cuts and bruises. Rugged cleats bite in for full traction in forward or reverse. For extra-rugged jobs, you can get tires with B.F.Goodrich FLEX-RITE NYLON construction.

FLEX-RITE NYLON construction provides double the impact of ordinary materials, resists heat blowouts and flex breaks. This B.F.Goodrich cord body outwears even extra-thick treads, can be retreaded again and again!

See your B.F.Goodrich dealer today. He's listed under Tires in the Yellow Pages of your phone book—and he has money-saving tires for every mining job. *B.F.Goodrich Tire Co., A Division of The B.F.Goodrich Co., Akron 18, Ohio.*

Specify B.F.Goodrich Tubeless or tube-type tires when ordering new equipment

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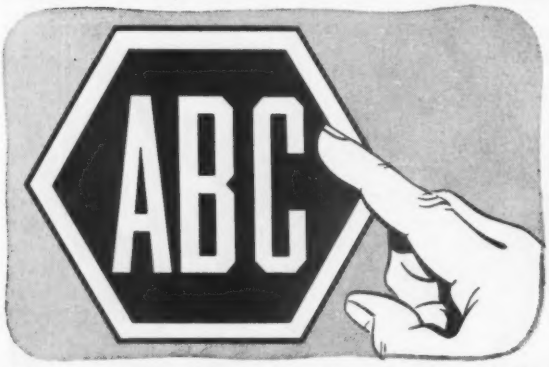

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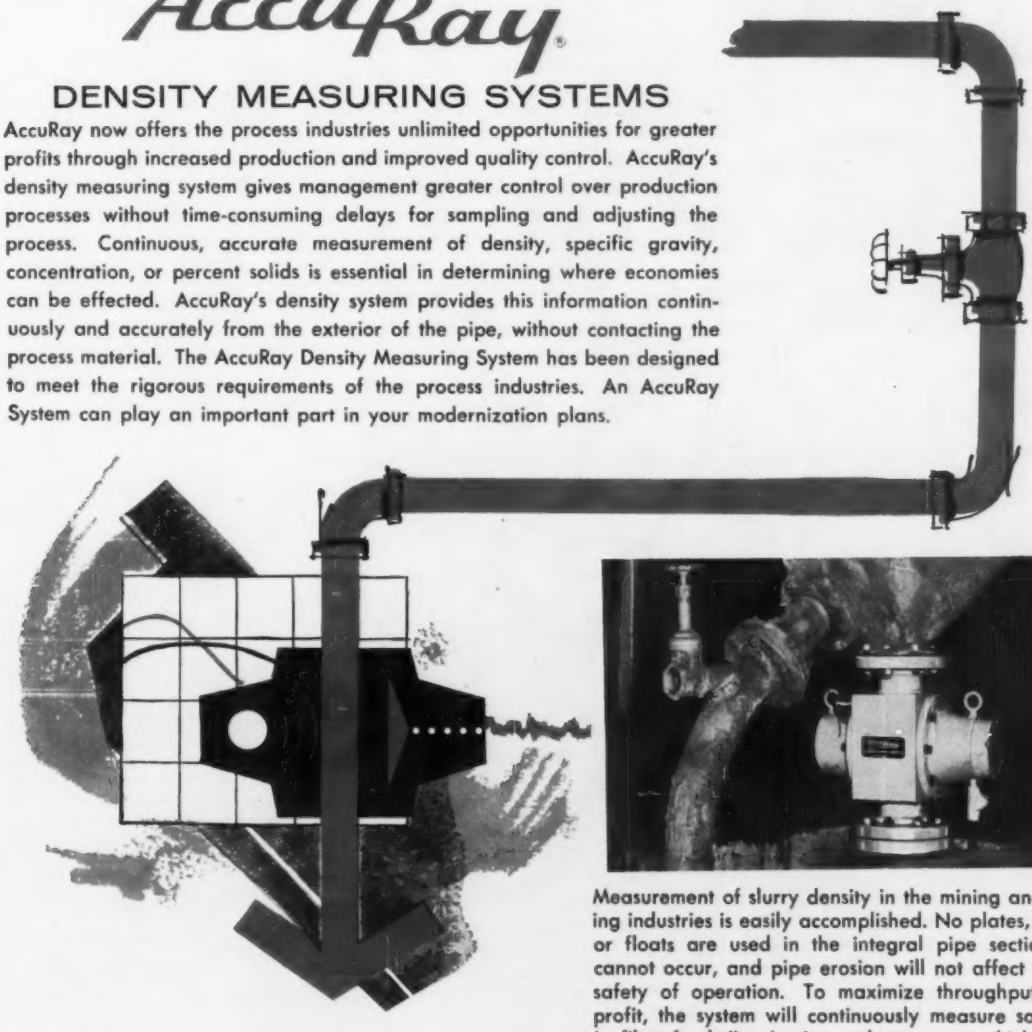

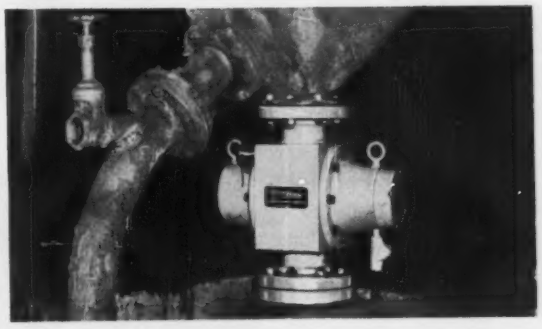

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Wraith Jr.

Graham

O'Rourke

Russel B. Caples, who has been vice president in charge of metallurgical operations, will continue as vice president of the Anaconda Co. In addition to other special assignments, he will coordinate and supervise the integration of all of the company's aluminum interests. He will continue as an officer and director of subsidiary companies. **William Wraith Jr.** has been advanced to the newly created position of metallurgical manager and will direct and supervise the metallurgical operations of Anaconda and subsidiaries. Wraith has been metallurgical assistant to Caples. **Thomas K. Graham,** formerly manager of the Raritan Copper Works of International Smelting & Refining Co., Perth Amboy, N.J., has been made assistant metallurgical manager of Anaconda.

John T. O'Rourke has been appointed assistant vice president of Anaconda-Jurden Associates, Inc., an Anaconda Co. subsidiary recently organized for planning, designing and engineering of industrial plants. A native of Denver, and graduate of Drexel Institute of Technology, Mr. O'Rourke was formerly a division engineer for Burns & Roe, Inc., New York.

Matt Fitzgerald is now manager of Rhodesian Anglo-American Mine Services at Kitwe, Northern Rhodesia. He was formerly concentrator superintendent at Bancroft Mines Ltd.

J. J. Brummer, formerly with Northwestern Explorations Ltd., Vancouver, B.C., is now with Kennco Explorations (Canada) Ltd., Toronto, Ont.

Manuel Elizalde has been reelected president of Samar Mining Co., Inc., the Philippines. Also reelected were **Jesus S. Carbarrus,** vice president; **Rafael Beltran,** treasurer; **Pacifico de Ocampo,** secretary; **Fausto Preysler,** assistant treasurer; and **Alfred G. Vellguth,** office manager.

D. B. Smith has been appointed mill superintendent for Consolidated Denison Mines Ltd., Spragge, Ont. A member of CIM, Smith formerly held a similar position with Stanleigh Uranium Mines, Elliot Lake.

J. D. Barrington has retired as president of Ventures Ltd. and was elected chairman of the board. **H. J. Fraser,** who is also president of Falconbridge Nickel Mines Ltd., was elected president and managing director. **J. S. D. Tory** retired as Ventures' board chairman, continues as general counsel. **H. S. McGowan,** president of La Luz Mines Ltd., was appointed vice president and general manager of Ventures, and **G. T. N. Woodrooffe,** secretary and treasurer, was made vice president-finance.

R. Campbell has been elected to the board of Falconbridge Nickel Mines Ltd. and was appointed executive vice president.

P. J. Mulcahy has been appointed deputy minister of mines for British Columbia, succeeding **Dr. John Walker.**

Roger Pemberton has been appointed senior technical representative to the mining industry for Canadian Aero Service Ltd. He is a member of CIMME, SEG, AIME, and KEGS.

S. G. Gamble is now director of the Surveys and Mapping Branch, of the Department of Mines and Technical Surveys, Ottawa. He succeeds **W. H. Miller,** who will retire later this year.

G. A. Apostolides is now manager of the Skoumsta chromite mine, Greece.

Tom T. Heywood has been appointed mine superintendent of Sematan Bauxite Ltd., Sarawak.

E. R. Gordon, formerly director of AEC's Exploration Div., Grand Junction Operations, is now assistant manager, Mineracao Hannaco Ltda.

Gustavo Camposano, formerly mill superintendent for Mining Enterprises Corp., is now a metallurgical engineer for Frontino Gold Mines Ltd., Colombia. **William Bourne Wood,** formerly research metallurgist for Consolidated Copper Mines Corp., has also joined Frontino, as chief chemist and research metallurgist.

Gene Dale has been transferred to Saskatoon, Sask. as surface superintendent with Potash Company of America Ltd. He was formerly assistant superintendent at PCA's Carlsbad, N.M. refinery.

Merrill A. Mosher has been made manager of Raritan Copper Works of International Smelting & Refining Co., Anaconda subsidiary. **John M. Casteras** has been named general superintendent. **Jehu P. Cooper,** assistant to the manager, retired as of Nov. 1 after 45 years of service.

Miss Lilly Nielsen (Mrs. Charles Hulburt), who since May 1933 has reported weekly and monthly metal prices via telephone, cable and telegram to foreign and domestic mining companies, has retired from the editorial staff of *Engineering and Mining Journal* and *E&MJ Metal & Mineral Markets* on Oct. 1.

Nielsen

Through her long service with *E&MJ*, Miss Nielsen has had contact with thousands of readers who have requested reprints, special market and price data, and references for specific information. Miss Nielsen has not only been a valued member of the present staff, but has also served with the former editors, Dr. H. C. Parmelee, Evan Just, and Robert H. Ramsey.

Dr. James Nowlan was appointed to the post of Deputy Minister of Mines for Nova Scotia, succeeding **J. P. Messervy** who retired at the end of June.

Dr. Franc R. Joubin, consultant for Rio Tinto, was elected president and director of Bralorne Mines Ltd. after the board accepted the resignation of **Austin C. Taylor,** who was one of the founders and original financiers of the company and its president for the past 27 years. **George Kidd,** another director of long standing, has also resigned, and is succeeded by **John B. Aird.**

Carlos Escalante Zeron has completed a two weeks' training course with the U.S. Bureau of Mines Health and Safety Activity office in Duluth. A mining engineer for the Mexican government, he is in the U.S. through the ICA program, to study mining methods.

John Stuart Smart Jr. has been appointed general sales manager of American Smelting & Refining Co. He obtained a B. S. Eng. degree from the University of Michigan in 1934; joined Asarco in 1936 as a metallurgist at the company's Central Research Laboratories, and rose to the position of assistant director of research from which post he assumed his present assignment. Active in the development of copper operations at Mount Isa Mines Ltd. in Australia, Mr. Smart is also well-known in European metal circles as an authority on the properties and treatment of copper. He has also been instrumental in developing several patented processes for the continuous casting of bronze and copper and is the author of a number of articles on copper.

Smart Jr.

More capacity, less weight, longer service life, and lower costs—these are the advantages you get by using USS "T-1" Steel in mining equipment.

Dippers that ram through rock

built stronger, tougher and lighter with USS "T-1" Steel

Did you ever cling to the "crow's nest" of one of the new giant shovels and feel it ram into a wall of rock and shale? The big machine shudders, then braces its feet and digs in with all its tremendous mechanical muscle. The dipper becomes a real battering ram—and you wonder how any steel can stand such punishment, day after day.

United States Steel engineers and metallurgists asked the same question, and developed a special steel, USS "T-1" brand. This steel can take terrific shock and impact abrasion. It's extremely tough—even at 50° below zero. And it is now available with more than three times the yield strength of structural carbon steel—100,000 psi minimum.

This great strength permitted a weight saving of 40 tons in one large shovel where "T-1" Steel was used in the dipper, dipper stick, bail and crowd rack. In spite of the high strength, shovel manufacturers had no difficulty welding, forming and machining this quenched and tempered alloy steel.

USS "T-1" Steel can help you. Consider it where you need a steel with great strength, extraordinary toughness, or resistance to impact abrasion combined with ease of fabrication. Write for our book *USS "T-1" Steel*. United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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PERSONALS *(Continued)*

Silbert

Kennedy

Edwin L. Kennedy, partner in the investment banking firm of Lehman Brothers, New York, and **Bernard M. Silbert,** president and general counsel of Pacific Uranium Mines Co., Los Angeles, have been elected to fill vacancies on the 10-member board of Kermac Nuclear Fuels Corp.

Dr. Miroslav A. Kriz, formerly chief of the Foreign Research Division of the Federal Reserve Bank of New York and author of a number of articles on the economics of gold which have appeared in *Engineering and Mining Journal,* has accepted recently a position with the First National City Bank of New York. In his new capacity he will follow international and foreign developments of interest to the bank.

Edwin E. Dowell, former field relations director of Reynolds Metals Co. public relations department, Richmond, Va., has been appointed public relations director of Kennecott Copper Corp.'s Western mining divisions.

Thomas W. Mitcham, consulting geologist and mining engineer, will give lectures in two graduate courses in the department of geology at the University of Arizona. He has recently moved his office from Flagstaff to Tucson, Ariz.

Dr. Albert J. Phillips, vice president and director of research of Asarco, South Plainfield, N.J., received the gold medal of the American Society of Metals at an annual meeting in Cleveland, Oct. 27-31. **Crawford H. Greenewalt,** president of E. I. Du Pont de Nemours & Co., Wilmington, Del., received the medal for advancement of research; **William G. Pfann,** physical metallurgist, Bell Telephone Laboratories Inc., Murray Hill, N.J. received the Albert Sauveur achievement award.

D. G. Rowe, formerly mine manager of Northspan Uranium Mines Ltd.'s Lacnor mine, has been assigned to mine planning and layout for the three Northspan properties. **A. M. Glendinning** has been transferred as mine manager at Panel to that of Lacnor. **G. A. Jewett,** formerly with Rio Tinto Management Services' operations staff in Toronto, is acting mine manager at Panel. **G. M. Godfrey** is the mine manager for Northspan's Spanish American mine.

Quenton L. Brewer, mining engineer and consultant, is now associated with H. J. Vander Veer and Associates. Formerly chief, engineering branch, and deputy director, exploration division, AEC, Grand Junction, Colo., Brewer had also been on the Colorado School of Mines' faculty, from which school he had taken his engineering degrees.

George W. Streepey was made general manager of Aluminum Co. of America's raw materials division, effective Oct. 1. **Herman E. Bakken,** vice president and general manager of Alcoa's refining division, retired Oct. 1 after nearly 40 years of service. **J. Ranald Fox,** formerly assistant manager of the division, succeeds Bakken as manager. **Dr. J. D. Bateman** has resigned from Ventures Ltd. and associated companies in Toronto, Ont., in order to establish a practice as a consulting mining geologist in that city.

Wayne L. Dalke, formerly in charge of United States Steel Corp.'s Oliver Iron Mining Div.'s Plummer concentrator, is now general plant foreman of the division's Arcturus concentrator.

Byron E. Grant, assistant general manager of Braden Copper Co., Chilean subsidiary of Kennecott Copper Corp., has been named general manager. He was graduated from the University of Utah where he studied mining engineering, geology and political science, and did postgraduate work at the University of California and the University of Idaho in mining geology, international law and diplomacy. In 1936 he joined U.S. Smelting, Refining & Mining Co. as resident geologist at Bingham, Utah. He later became superintendent, general superintendent, assistant manager, assistant to the vice president and general manager, and director of labor relations, Salt Lake City, before joining Braden Copper in Chile in 1955. He is member of the Mining and Metallurgical Society of America, the AIME, American Mining Congress and the Chilean Institute of Mining Engineers.

Grant

L. R. Garland, formerly mill superintendent of Cowichan Copper Co. Ltd. and of Yale Lead & Zinc Mines Ltd., has been named engineer in charge of Mexuscan Development Corp. Ltd.'s Alamos, State of Sonora, Mex. operations.

A. E. Pike has been appointed resident manager and **C. D. N. Taylor,** assistant manager of United Keno Hill Mines Ltd., Mayo district operation. **J. B. C. Lang** succeeds Pike as mine-production manager. **N. Gritzuk** continues as manager, transport divisions of United Keno and Cassiar Asbestos Corp. Ltd. and as manager, Territorial Supply Co. Ltd., Whitehorse, Y.T. He is also consulting metallurgist for United Keno.

Howard C. Pyle, president, a director and chairman of the Monterey Oil Co., has been elected president of American Institute of Mining, Metallurgical and Petroleum Engineers for the one-year term starting next February at the annual meeting in San Francisco. He will succeed **Dr. Augustus B. Kinzel,** vice president for research of the Union Carbide Corp. **Dr. Joseph L. Gillson,** of Wilmington, Del., has been nominated president-elect. He is chief geologist of E. I. du Pont de Nemours & Co.

Albert P. Gagnebin has been elected a vice president of the International Nickel Co., Inc. A mechanical engineer and metallurgist who joined the company in 1930, he devoted his early career to research on ferrous metals and in the development of ductile iron, of which he is a co-inventor. He was elected an assistant vice president last December. **Joseph M. Weldon,** assistant to the vice president, is now assistant vice president.

C. O. Mittendorf has resigned as administrator of the Office of Minerals Exploration, successor agency to the DMEA. He has accepted a position with the International Cooperation Administration in Iran.

Walter R. Barker, chairman of the board of Uarco, Inc., Chicago, was elected to the board of directors of Sabre-Pinon Corp. Other directors reelected were: **Richard D. Bokum II, Hugh M. Craigie, Mahlon S. Kemmerer, W. R. Montgomery, Coleman W. Morton** and **Henry H. Patton.**

Dr. William H. Schuette has been elected a vice president of Dow Chemical Co., Midland, Mich.

Dr. Malcolm T. Hepworth, formerly minerals research engineer for General Motors and Union Carbide corporations, has been appointed to the metallurgical engineering staff of Colorado School of Mines. **Wilbur J. Guay,** formerly a research engineer with Anaconda Co., is a new metallurgy instructor. **Mrs. Frances Fry,** who holds a bachelors degree from Waynesburg College, is a new research technician in metallurgy. **Dr. Leonid Bryner,** formerly a geologist with the U.S. Geological Survey and geologist for Bear Creek Mining Co., was named an assistant professor of geology. **Ulf Berg,** previously an explosives engineer for DuPont Explosives Laboratory and an explosives research physicist at Sweden's National Defense Research Institute, has been named a mining engineering laboratory research assistant.

David H. Orr Jr. is now mine superintendent for Phelps Dodge Corp., Morenci Branch, Ariz.

L. H. Davenport has been appointed supervisor of materials engineering in Consolidated Mining & Smelting Co. of Canada's engineering development department, Trail, B.C.

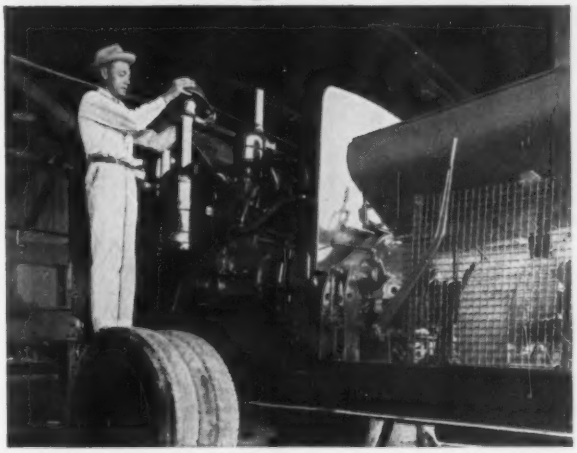
ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL

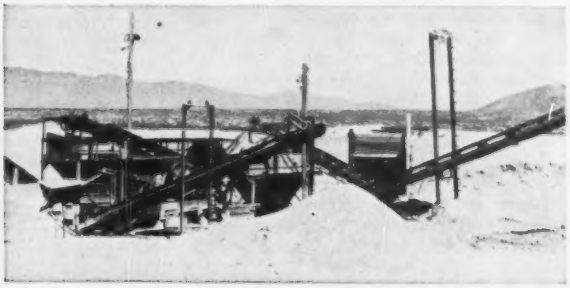
FIRM M. M. SUNDT CONSTRUCTION CO. Tucson, Arizona

RPM DELO OIL ends 5 years of engine troubles

The pan has never been off the Caterpillar D7 engine of this Link-Belt Speeder shovel in 7 years, using RPM DELO Oil. Only repair was a single valve job—no other parts replaced. William Naumann, Sundt's Operations Manager, says, "We tried nine different major brands of oil in five years, trying to lick the frequent breakdowns that slowed our operations. Sometimes, main and rod bearings even froze solid on the crankshaft. We changed to RPM DELO Oil seven years ago, and, since then, have never had any engine troubles due to oil failure. We now use RPM DELO Oil exclusively in our 22 heavy-duty engines."



Lubricated with RPM DELO Oil, this Caterpillar D 13000 portable unit powered a rock crusher of M. M. Sundt Construction Co. for a total of 8976 hours before overhaul. "In spite of extremely dusty conditions the only time the engine was touched was to replace a head—no other repairs were necessary," reports master mechanic Billy Gray, shown replacing air cleaner on unit following overhaul.



Austin 101 rock crusher, powered by Caterpillar unit described above, works 20 hours a day at firm's materials stockpile outside Tucson. Company works year around on road paving, grading, foundations, building construction.

Why RPM DELO Oils reduce wear —prolong engine life

● Oil stays on engine parts—hot or cold, running or idle ● Anti-oxidant resists lacquer formation ● Detergent keeps parts clean ● Special compounds prevent corrosion of bearings ● Inhibitor resists crankcase foaming

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PERSONALS *(Continued)*

Alan R. Fraser, formerly with Armour Research Foundation as supervisor of extractive metallurgy research, and with Chromium Mining & Smelting Corp. as vice president of exothermic alloys-sales and services, has joined American Chrome Co., Nye, Mont. as director of metallurgical sales-services. Chicago offices were opened Oct. 1.

Fraser

R. M. P. Lauer, formerly at Consolidated Mining & Smelting Co.'s Con property at Yellowknife, N.W.T., is now superintendent, development and technical control, Sullivan concentrator, Kimberley, B.C.

G. S. Giles is now the general manager of Nchanga Consolidated Copper Mines, succeeding the late **L. W. Allen. Dr. W. J. de Villiers** succeeds Mr. Giles as manager of Rhokana Corp., Johannesburg.

K. H. McMahon, formerly mine manager of New England Antimony Mines (who had previously worked in British Columbia and the western U.S.), is now assistant to the managing director of the Commonwealth Mining Investments (Aust.) Ltd., Sydney.

James S. Westwater, manager of Michigan mines for Cleveland-Cliffs, Ishpeming, has been made vice president-mining, succeeding **C. W. Allen,** who has joined the Industry Resources Section of the ICA, Washington. **H. J. Leach,** formerly manager of Minnesota mines, is now manager of Michigan mines. **John J. Foucault,** formerly superintendent of Holman-Cliffs Mines, succeeds Leach as manager, Minnesota Mines. **Stanley W. Sundeen** becomes manager Research and Iron Ore Development.

H. V. Sears, promoted to general prospecting superintendent of St. Joseph Lead Co., Bonne Terre, Mo., replaces the late **James E. Jewell.**

Ralph L. Hennebach was recently appointed assistant to the vice president of American Smelting & Refining Co.'s smelting and refining department, Salt Lake City, Utah.

Charles G. Quigley, formerly superintendent of Kennecott Copper Corp.'s Arthur mill, Garfield, Utah, is now head of the newly organized quality control department and will direct assaying, sampling, and quality inspection. **Wayne H. Burt** succeeds him in his former post.

Willard Glenn, former assistant safety engineer for Miami Copper Co., Miami, Ariz., succeeds **Verne C. McCutchan** as Arizona deputy mine inspector. The latter has resigned and plans to operate his own mine.

Robert G. Doyle was recently appointed to the position of geologist with the Maine Geological Survey. Prior to his appointment, Mr. Doyle was for five years associated with the St. Joseph Lead Co. in Southeast Missouri as mine geologist. A graduate of Harvard College, he has also spent several years in Peru as a field geologist.

Doyle

Obituaries

Roy J. Henry, 60, president of Eldorado Mining & Refining Co. Ltd., died in Ottawa, July 6. He was also head of Atomic Energy of Canada Ltd. Mr. Henry, who had taken a B.Sc. degree in 1922 from the University of Toronto, continued his engineering studies on a Dominion science scholarship at the Royal School of Mines, Imperial College of Science and Technology, London, obtaining his diploma in 1925. He was on the staff of Teck Hughes Mines Ltd., Kirkland Lake for 12 years and as a consulting engineer in Toronto until 1939, when he became resident engineer for Upper Canada Mines Ltd., Dobie, Ont. He had joined Eldorado in 1952.

Donald J. Cross, 48, staff member of the Ontario Department of Mines and for five years mining recorder at Port Arthur for the Ontario Department of Mines, died June 27 in Britain.

Manley B. Baker, 81, emeritus professor of geology, Queen's University, died in Kingston General Hospital, Aug. 4. Active as curator of the Geological and Mineralogical Museum, Professor Baker received the honorary degree of LL.D. from the university in 1948. He had been a member of CIM since 1908.

Harold Jones, reduction officer for the St. John d'el Rey Mining Co., Ltd. until his retirement in 1948, died at Minas Geraes, Brazil, June 6.

Harold Leslie Batten, 72, a well known British Columbia mining engineer, died at Qualicum Beach, July 9. He was graduated from the University of Toronto in 1911 as a mining engineer, working in Ontario and Arizona mines for two years. In 1913 he joined Consolidated Mining & Smelting Co. of Canada Ltd. at Trail. In 1925 he went into partnership in consulting work with the late R. H. "Pat" Stewart. In 1935, he became a director and consultant for Canadian Exploration Ltd. He was a member of IMM, CIMM and AIME and Association of Professional Engineers of B.C.

K. Sherman Oliver, 54, pioneer mine executive, died in August near La Pas, Man. on property of Allcop Mines, of which he was president. Associated for many years with mining ventures across Canada and the U.S., he was one of the first prospectors to actively pioneer the development of the Beaverlodge area and was instrumental in the formation of Lorado Uranium Mines, of which he was president until last fall. He was a director of the Prospectors and Developers Association and a member of the Toronto Engineers' Club.

Nathan Jowsey, 79, veteran prospector and pioneer in the Kirkland Lake gold camp, died in August at Hanbury, six miles north of New Liskeard, Ont.

Reginald Pawle, 88, who in 1893 began his association with the Far East at the Borneo Co., Ltd., Sarawak, died Aug. 10. From 1909-12 he was general superintendent of Pahang Consolidated; 1913-36, a partner in the consulting firm of Pawle and Brelick. He was a member of the Institution of Mining and Metallurgy, and was also a one-time member of the Council of the Malayan Chamber of Mines and of the Tin Producers' Association.

George G. Gallagher, 58, AEC technical adviser to the Raw Materials Division, died in Washington, D. C. He was associated for several years with the United Verde Copper Co., and was superintendent of the Banner mine for the Lava Cap Gold Mining Corp. in 1936. After spending a short time in the Mother Lode district, he joined, at the beginning of WW II, the mining division of the Reconstruction Finance Corp. After the war he spent one year in Mexico, returning in 1949 to Washington and the AEC.

Arthur Herbert Shore, discoverer and a director of Faraday Uranium Mines, died July 10, at Trout Creek, Ont.

W. T. MacDonald, 80, mill superintendent at International Nickel Co.'s Copper Cliff concentrator for some years, died at La Jolla, Cal. A graduate of Columbia University School of Mines, Mr. MacDonald went to the Nickel Belt in 1929 and remained until 1936 when he retired.

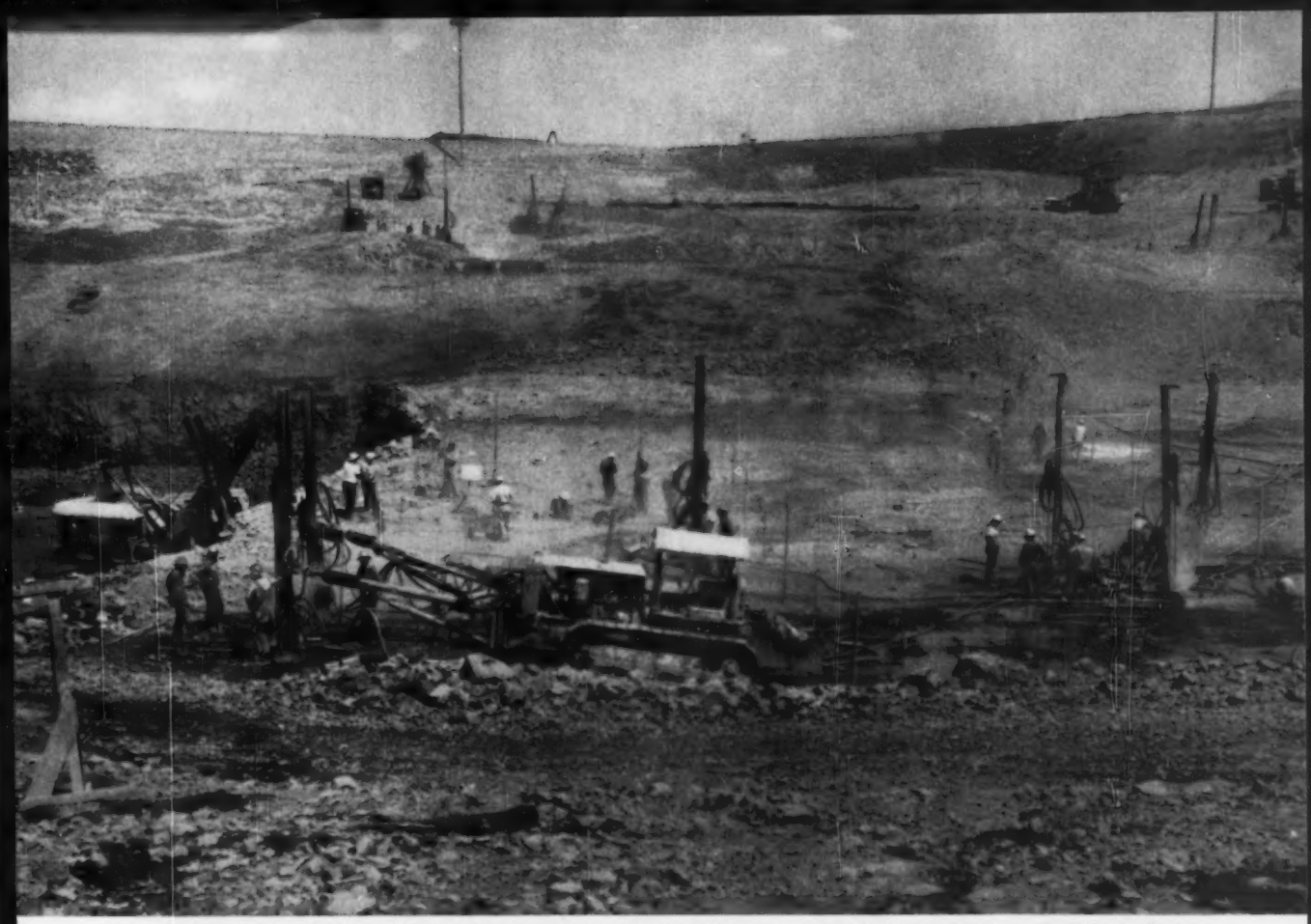
Arthur W. Worcester, 67, retired mining engineer, died **Sept.** 15. A graduate of Colorado School of Mines, Worcester worked as a mining engineer in Arizona, New Mexico and Central America before joining the Bureau of Mines during World War II.

Ross H. Barnum, noted Ontario prospector, died at Port Arthur, July 23.

Ulysses G. Lovvorn, 89, retired St. Joseph Lead Co. employee, died Aug. 18, in Elvins, Mo.

James M. Webb, 79, retired St. Joseph Lead Co. employee, died Sept. 9, Farmington, Mo.

William Cox, 81, retired employee of St. Joseph Lead Co., died in Bonne Terre, Mo., Aug. 19.



Bethlehem Hollow bites into hard basalt at site of powerhouse for Ice Harbor Dam, being built on Snake River, Washington, by U. S. Army Corps of Engineers, Walla Walla District. *Contractor:* Montag-Halvorson-Austin & Associates. Drill steel furnished and reconditioned by Senter Tool Service.

Boring into basalt at Ice Harbor

Ice Harbor Dam, currently under construction, is the first of four dams planned for the Lower Snake River, in southeast Washington. Ultimately, this water-control system will extend slackwater navigation from the confluence of the Snake and Columbia Rivers, a distance of 150 miles, to Lewiston, Idaho. Ice Harbor Dam will be 2,790 ft long, and will control a 35-mile reservoir.

The project called for the removal of 780,000 cu yd of basalt, and the drilling phase was accomplished economically with Bethlehem Hollow Drill Steel. Blast holes ranged from 12 ft to 24 ft deep.

Bethlehem Hollow Drill Steel is ideal drill steel for economical rock drilling. It's tough, fatigue-resistant, long-lasting. Its uniformly round hole is centered in the bar. It has a wide quenching range. Moreover, it is easy to heat-treat to attain the proper balance of toughness and wear-resistance, making possible strong threads and shanks.

You'll do well to specify Bethlehem Hollow for every drilling job. It comes in Carbon and Ultra-Alloy grades in rounds, hexagons, and quarter-octagons, and in lengths from 18 ft to 27 ft, and longer.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

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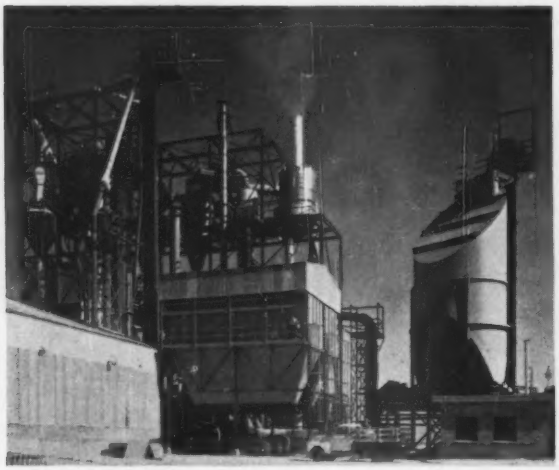
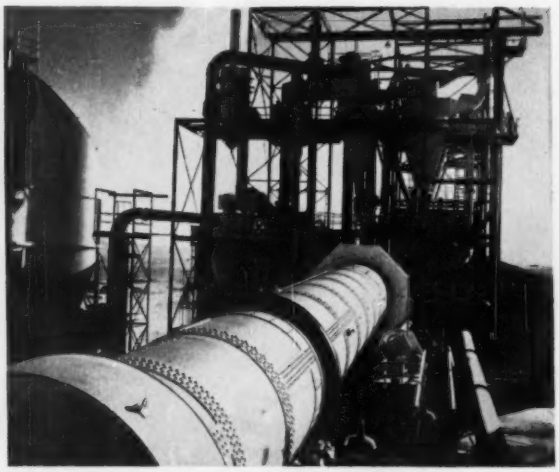


THE 63-ACRE plant will produce natural, calcined, and process calcined filter aids at the rate of 36,000 tpy.



AFTER initial processing through a series of fans, cyclones, and traps, the material passes through a 9x120 ft rotary kiln.

Eagle-Picher Opens 36,000-tpy Diatomaceous Unit

EAGLE PICHER'S new $2.5-million diatomaceous earth processing plant at Colado, six miles east of Lovelock, Nevada, opened operations during September. Constructed by Kaiser Engineers Co., it will handle ore from the company's extensive deposits in the Trinity mountains, 30 miles west of Lovelock.

The Colado plant will produce clean, dry particles of diatomaceous earth of the proper structure and size range. This range varies from different diatomaceous earth products but is generally from about 1 to 20 microns.

Selective mined ore is first reduced in a hammermill to ⅜-in. lumps or smaller. This material is dropped into a large fan which has two functions: (1) it further reduces the ore lumps to as nearly individual diatoms as possible, and (2) it also creates an air stream of sufficient velocity to convey the milled material to the first cyclone.

The cyclones have a cylindrical upper part, 9 ft in diameter, with a comparatively long cone bottom. When an air stream containing material is blown into the cylindrical part in a tangential direction, the particles tend to be thrown by centrifugal force to the outside of the cylinder, slide down the conical portion and may be withdrawn at the bottom. The air and fine particles escape at the top of the cyclone.

The first cyclone separates fine dust from the diatomaceous earth. The processed material drops from the cyclone cone into a stream of hot air produced by a furnace. Drying is accomplished as the material travels through a duct to a second cyclone.

The second cyclone is designed to remove the ore lumps which passed the first fan without being broken up and to pass the air stream containing the clean, properly sized diatomaceous earth to the next step in the process. The unmilled lumps from the trap are passed through a separator which draws out small pebbles, clay lumps, or other extraneous material and returns the diatomaceous earth to be remilled and reintroduced into the circuit.

This completes the initial processing and, depending on the end-product, the material is either passed directly to the finish end equipment or to the kiln and then to the finish end.

The finish end shipment consists of a series of fans, cyclones and traps similar to the initial processing section where the material may be further milled, sized, and classified, depending upon the desired product.

The plant's rotary kiln is 9x120 ft and is equipped with an oil burner. The material, after initial processing, is passed through the kiln which raises its temperature to approximately 2000 deg F. This heating has several functions, including the burning out of any minute impurities not removed by the initial processing or fusing them into a slag which can be removed with the finish end equipment, and the heating of smaller particles (broken diatom shells) almost to the melting point to fuse them into a fritted product which will act somewhat like whole diatoms in a filter-aid material.

The finished material is conveyed to a product bin, then to packing.

Bunker Hill, St. Joe, Falconbridge Study Bid for the Government's Nicaro Plant

A NEW FIRM, North American Nickel Corp., has been set up to bid on the U.S. government-owned nickel plant at Nicaro, Cuba(*E&MJ* September 1957 p 82.)

A 30% interest in the new company is held by each of three mining companies—Bunker Hill Co., St. Joseph Lead Co., and Falconbridge Nickel Co., Toronto. Blyth & Co., Inc., San Francisco investment firm, owns the remaining 10%.

John D. Bradley, president of Bunker Hill, said the new firm will spend $100,000 (its initial capitalization) on a study which will enable it to prepare a bid.

Bradley said the sponsoring firms are looking into the Nicaro plant because it appears to offer a good potential for long-term, profitable operation, and it would provide diversification for at least two of the companies (Bunker Hill and St. Joseph Lead). He added that they consider the outlook for nickel good, despite present overproduction problems, and the fact that the Nicaro plant has established market outlets make it more attractive.

The new firm was formed in anticipation that the Government might decide to sell the plant to a private company. North American probably would be bidding against Freeport Sulphur Co., who has valuable nickel properties in the area, and Nickel Processing Corp., a National Lead Co. subsidiary that is now operating the plant.

The Government has invested some $85-million in the Nicaro operation.

North American Nickel will be headed by Harold E. Lee, vice president in charge of research and development for Bunker Hill.

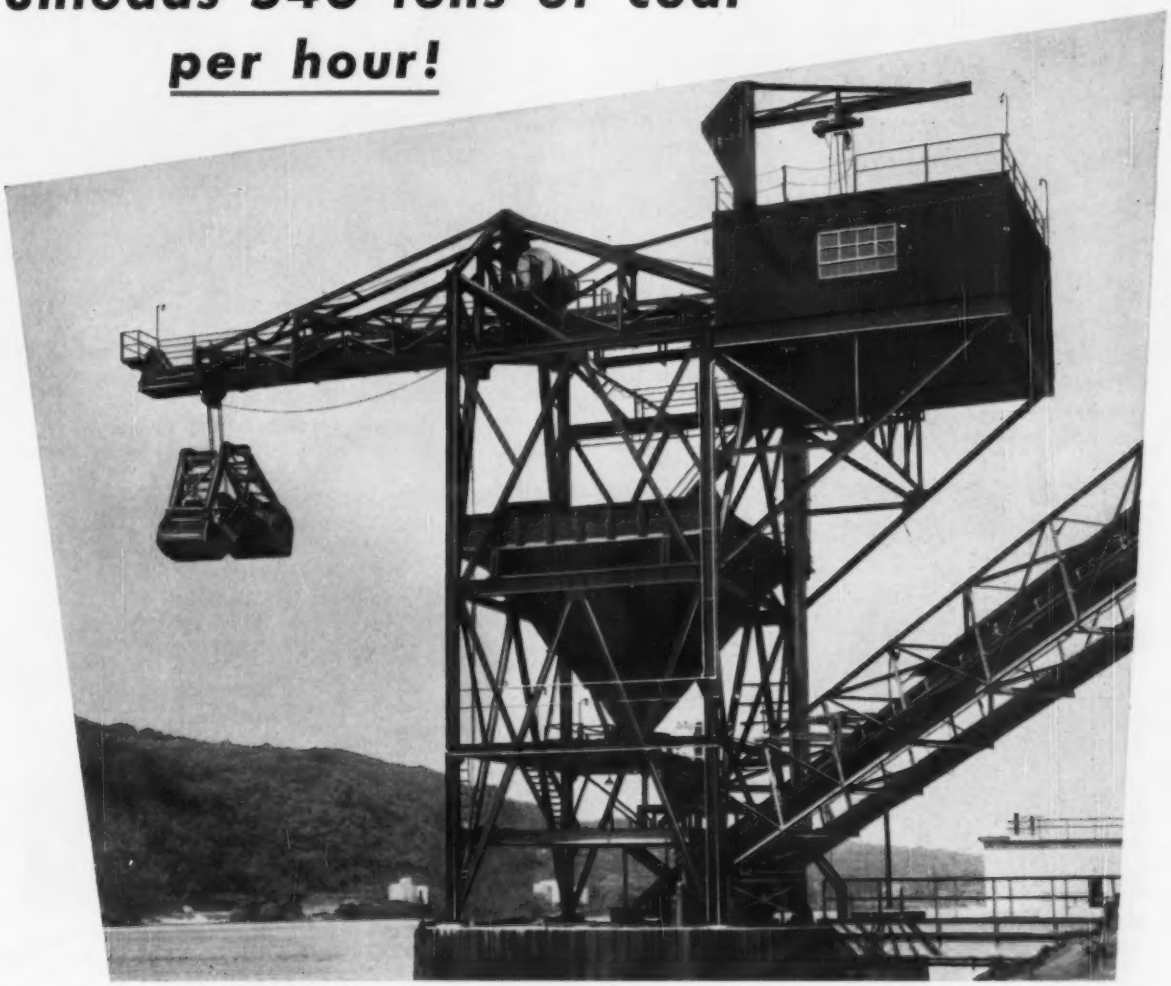
Serving as vice presidents of the new firm are Francis Cameron, St. Joseph Lead vice president, and Edward Glassmeyer, vice president of Blyth & Co.

This Month in Mining

(Continued on p 140)

BROWNHOIST TOWER

unloads 540 tons of coal per hour!



Designed and built to unload coal from barges to a power plant on the Ohio River, this Industrial Brownhoist stationary tower crane achieves a production rate of 540 tons per hour! Barge hauls move barges to proper location underneath unloader and coal is transferred to 100 ton bin built into the tower and then fed on to a belt conveyor to the plant. All motions are controlled by operator from one position in operator's house which is pressurized with clean air provided by a blower.

The tower, with a 6-ton rope system, is fixed to a concrete cell and is of all-welded construction. Erection joints are fastened with high strength bolts. A pillar crane is fixed to the tower to service electrical and machinery parts in the machinery house.

Industrial Brownhoist designs and builds specialized equipment like this tower in any tonnage and capacity for handling any material at sea ports, steel mills, ore and coal docks and railroad yards throughout the world. For more information on reliable high speed, high capacity material handling equipment, write for catalog 562.

209

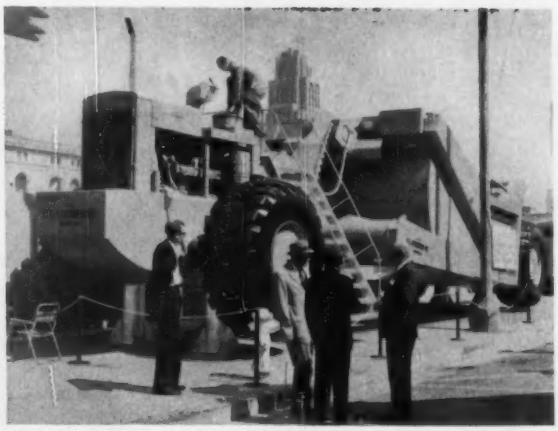
BROWNHOIST

CLAMSHELL BUCKET 250 TON WRECKING CRANE COAL-ORE BRIDGE CAR DUMPER LOCOMOTIVE CRANE

INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN • DISTRICT OFFICES: Cleveland, Philadelphia, Chicago, San Francisco, Montreal.

• **AGENCIES**: Detroit, Birmingham, Houston

EQUIPMENT gets bigger and bigger as the mining industry goes after lower grade, heavily overburdened mineral deposits.



BIGGEST of the big was a 100-to 125-yd capacity scraper by R. G. LeTourneau, powered by four electric wheel motors.

BIGNESS was apparent, too, in the Model 380, 375-hp dozer shown by Clark Equipment Co. Dozer has eight speeds.

325 HORSEPOWER was put in this 27-ton model by Euclid. Truck has a 4-speed drive, capacity of 26 yd heaped.

AMC Members Study Quotas, New Ideas

MEMBERS ATTENDING the 1958 American Mining Congress mining show in San Francisco Sept. 22-25 were hard put to cover the three rings of importance:

1. Announcement by Secretary of Interior Fred A. Seaton of the imposition of the quota system for lead and zinc imports;
2. One of the most impressive equipment exhibits in AMC history;
3. Presentation of extremely valuable information in a large number of technical papers at remarkably well-attended sessions.

The industry, as represented by the more than 6,000 AMC members and visitors who attended the convention, took an extremely cautious attitude toward the Administration's quota plan. Later developments would seem to show beneficial results of the plan, but at its announcement industry spokesmen doubted any long range improvement in lead and zinc marketing.

The industry's reaction was articulated by Charles E. Schwab, assistant to the president of Bunker Hill Co. and chairman of the industry Lead and Zinc Committee. Noting that full details of the quota plan were not yet available at that time, Schwab expressed doubt that the plan would cause an appreciable improvement in prices, profits or employment.

"But," he said, "there has been a policy breakthrough, no matter how inadequate it may seem to be." The speaker noted that the lead-zinc quota system is the first non-agricultural quota system set up under the escape clause provision of the Administration's tariff machinery.

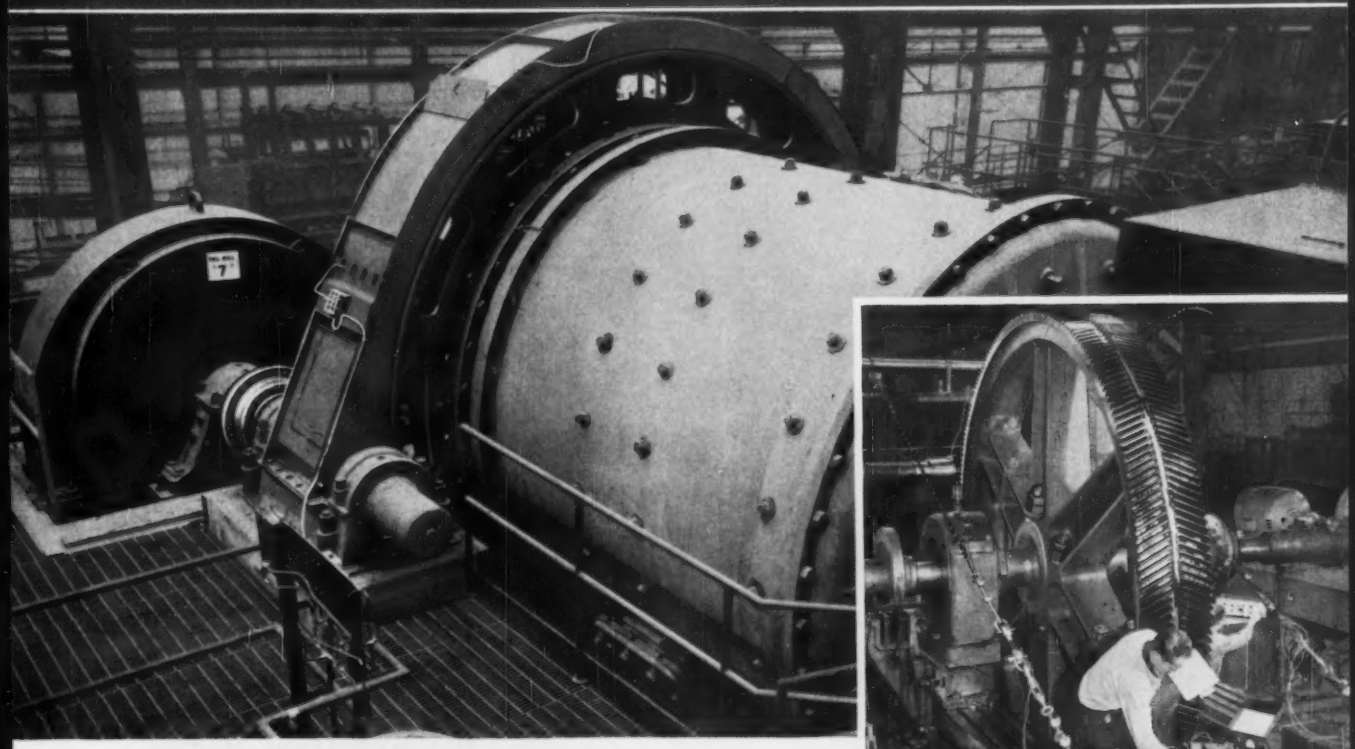
He reminded his audience that the lead-zinc industry had been told last year when industry injury from foreign imports was "found" for the second time by the Tariff Commission that their best avenue for aid was to ask for the full limits in tariffs to protect their market. They applied, Schwab said, for the full tariff coverage and, when they realized that total protection would not be available, asked for quotas to supplement their appeal.

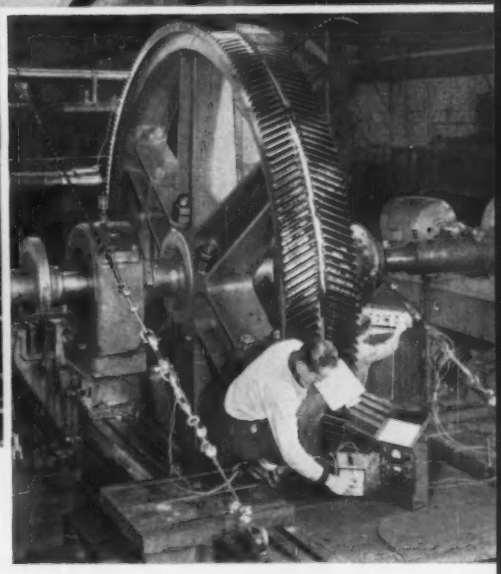
The Administration plan, Schwab noted, "stabilizes" current production, but he expressed little optimism for great improvements in domestic mining when the consumption of the U. S. consumer was depressed. "No consumer need worry," he said, "about a shortage of metal."

The industry committee chairman congratulated the various members of the Senate and House who had fought for

(Continued on p 174)

HELICAL GEARING BY **FALK** ...FOR MILLS AND KILNS





Falk Gears are *the Most Efficient* you can buy...

and are the most economical in the long run!

These are broad claims—but they have been proved beyond question by countless laboratory tests and confirmed by the actual experience of leading mill and kiln operators and engineers.

Falk ring gears transfer the gear tooth load directly to the shell flange of mill or kiln. They are correctly designed and of rugged proportions for maximum rigidity and accuracy. These helical gears—with extra-depth, extra-capacity teeth—provide a single-mesh, high reduction ratio drive giving you these advantages:

- Gear efficiency of 98+% (see column at right)
- High motor speeds—hence saving in motor and power costs
- Smooth helical gear action
- Maximum resistance against abrasive wear
- Longer service life of gears and of driving and driven machinery

This all adds up to the highest efficiency and greatest over-all economy. Don't compromise with quality on your gearing. *Insist upon Helical Gears by FALK*—the country's pioneer and leading supplier of precision gearing.

Consult any Falk representative—also, write for **Engineering Report 6170,** "Advantages of Helical Gearing."

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GEAR EFFICIENCY PROVED BY SPECIAL LABORATORY TESTS

In the Falk Mechanical Test Laboratory, continual full-load tests of helical gears and gear units are conducted to provide accurate data on gear efficiency. Load efficiency, speed, lubrication and capacity tests are made.

The above photo shows the use of special testing equipment to obtain data on mechanical efficiencies of Falk helical gears. Tooth pressures corresponding to rated capacity and speed are applied through a loading device equipped with strain gages for accurate load measurement. Power losses are determined by an accurately calibrated torque meter on the connecting shaft of the motor.

Test data show the average tooth-mesh loss for a single-reduction set of Falk Helical Gears is *less than* 1½% of the rated capacity. Thus, the efficiency of the gears is 98½% *or greater*—proof that Falk Helical Gearing is the most efficient obtainable.

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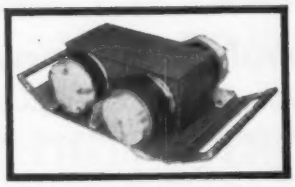
new, Safe, plug-in convenience

for portable cable to 7500 volts

PLM Cable Couplers help put higher voltage a-c power to work easily, efficiently, *safely*. Designed especially for use in open-pit and deep-mining operations, they give plug-in convenience for connecting portable cable up to 7500 volts, to electric shovels, portable substations or other applications.

Coupler consists of plug and socket, with contacts mounted in single-piece, pressure-molded insulators and housed in heavy cast aluminum housings. Safety features protect personnel and equipment. Optional mechanical and electrical features meet complete range of requirements. Rating, 300 amperes, 7500 volts, grounded neutral. Write today for descriptive bulletin 375. PLM Products, Inc., 3183 West 150th St., Cleveland 11, Ohio.



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Two, three or four-way assemblies of PLM Cable Coupler plugs or sockets give added plug-in convenience.

SAFE
no exposed connections

SAFE
electrical and key-type interlocks guard circuit

SAFE
contacts always made or broken within housing

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CABLE PLM COUPLERS

Eaton-Krupp Group Will Begin Ungava Project

A $200-MILLION Ungava Bay iron ore development project will begin next year, according to an agreement signed by the Cyrus S. Eaton-Alfried Krupp interests and the Quebec government.

On a 50-50 basis, the two industrial groups have established Ungava Iron Ores Ltd. which will be responsible for developing the 136 sq mile ore concession at the northern part of Quebec province.

According to the *New York Times* (Oct. 10, 1958), the agreement was confirmed in essence by both federal officials in Ottawa and province spokesmen in Quebec City.

The project's first production will be in 1961 at the rate of 500,000 tons of partly refined pellets a year. This would be stepped up to 2-million tons by 1963 and to 5-million tons by 1965.

Mining will be by open pit where the grades average 34 to 37%, and the main townsite will be at Hope Advance Bay on Ungava Bay.

Nine companies (four controlled by Mr. Eaton and five based in Germany) are supporting the giant project. The Eaton firms are the Champlain Mining Corp., International Iron Ores, Ltd., Steep Rock Iron Mines, Ltd., and Cleveland Cliffs Iron Ores, Ltd. The Krupp associates are headed by Ferrum Investments, Ltd.

Research Team Studies Nepheline Syenite Use

NEW USES may be found for nepheline syenite. Researchers at Ohio State University hope to find a way to adapt or eliminate the high iron content found in U.S.-mined deposits so they can be used in ceramics.

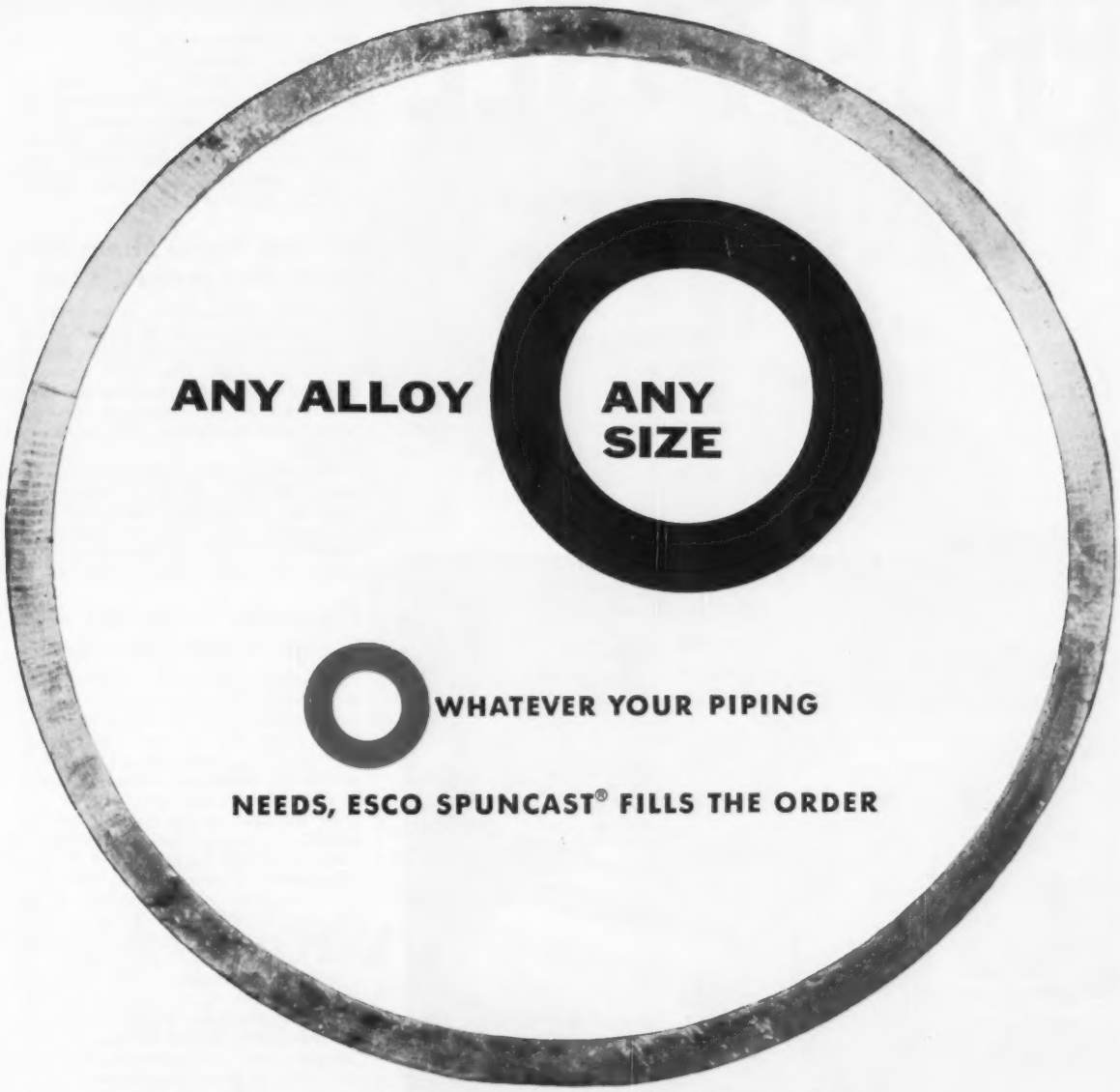
Dr. Charles J. Koenig, research professor at the university's Engineering Experiment Station, pioneered efforts to expand usage of the product. He is confident that his team—now consisting of Dr. Robert C. Wilson and three part-time students—eventually will overcome the iron content problem and be able to prescribe uses for the large deposits of nepheline syenite found in this country.

Philippine Nickel Act Eased to Attract Funds

THE PHILIPPINE CONGRESS has amended the so-called "Nickel Act" to get foreign companies to seek concessions for mining the Surigao laterite deposits along Mindinao's northern coast.

American technicians of the International Cooperation Administration have worked with the Philippine Bureau of Mines for several years in an exploration and metallurgical research program on the Surigao deposits.

Exploration has disclosed 129,900,000 metric tons of laterite deposits containing 46.71% Fe and 0.93% Ni. The same area has 13,020,000 metric tons of serpentine ore containing 14.91% Fe and 1.70% Ni. The laterite, averaging seven meters in thickness, covers an area of about 2,500 hectares. The recoverable iron, nickel and



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Nickel Act *(Continued)*

cobalt are estimated to gross $6-billion at present American prices.

The Philippine Bureau of Mines has studied the proposed mining project on the basis of operating costs and prevailing world market prices for the minerals. This survey indicates that, despite heavy initial investments, the Surigao deposits could be mined at a profit.

BC and Yukon Mines Men Open Prospectors' Class

THE 41ST ANNUAL SERIES of prospectors' training classes sponsored by the British Columbia & Yukon Chamber of Mines has gotten under way. The course is designed to give an elementary and practical coverage of mineralogy, geology, mining and prospecting, and blow-pipe analysis.

Chamber of Mines' officials stated that during the past 40 years some 3,500 men and women have been trained as prospectors, and that an appreciable number of them have been successful in making important mineral discoveries.

Fluorspar Producers Ask Escape Clause Support

INDEPENDENT FLUORSPAR PRODUCERS of the Illinois-Kentucky mining district have renewed their efforts to obtain legislative relief from import competition which, they maintain, is injuring the domestic market and thereby endangering national security. Government stockpiling of acid grade fluorspar, which has largely kept operation alive in recent months, is scheduled to end Dec. 31, 1958.

A conference of producers, held Sept. 8 in Rosiclare, following defeat of the Minerals Stabilization bill, resulted in re-instatement of an application for limitation of imports with the OCDM.

Original application, filed June 21, 1955, has been on an inactive list. The present request is for re-activation of the petition and an early hearing. A new "escape clause" application also has been filed with the Tariff Commission.

Producers hope for immediate action on both applications in order that recommendations from OCDM and the Tariff Commission may be in the hands of the President by late December or early next year.

New Group Will Work Baie Verte Asbestos

PREMIER J. R. SMALLWOOD recently announced in Newfoundland that a new group of investors has joined with Advocate Mines Ltd., Toronto, to develop an asbestos fiber deposit in northern Newfoundland. The report said that $1-million will be spent at the outset to explore and develop the orebody at Baie Verte.

The funds would be made available by the group which would include Patino Ltd. of Canada, Amet Corp. Inc., Financiere Belge de l'Asbestos-Ciment S.A., and Canadian Johns-Manville Co. Ltd., the announcement said.

Under present plans, exploration and

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Sheath is tough, oil- and moisture-resistant, flame-retardant Roeprene.
Sheath surrounds and grips serrated conductor insulation ... conductors are locked fast, can't "sleeve."
Ground conductor has braided green cotton covering. It strips clean for easy terminating, splicing.
GR-S insulation around each power conductor is heat- and moisture-resistant.
Ground conductor is braided and eased into shape from fine annealed copper wire for outstanding resistance to flexing fatigue and tensile stress.

For the **extra life** that's **money in your pocket...**

ROEBLING PARALLEL TWIN CABLE!

This economical, extra-flexible cable is available as Type G, with ground wire, or Type W, without. Complies with the flame resistance test of the State of Pennsylvania, Department of Mines, and the requirements of the U. S. Bureau of Mines, and carries the marking P-111BM.

A combination of quality features makes Roeprene® Parallel Twin Mining Machine Cable different and better. Some of these features may seem like small details . . . but, taken together, they figure *big* in terms of easier installation and maintenance, and valuable *extra* service life. Flexible Roeprene Parallel Twin Cable is built to take tough treatment!

For more details about these cables, and the savings they mean, write Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

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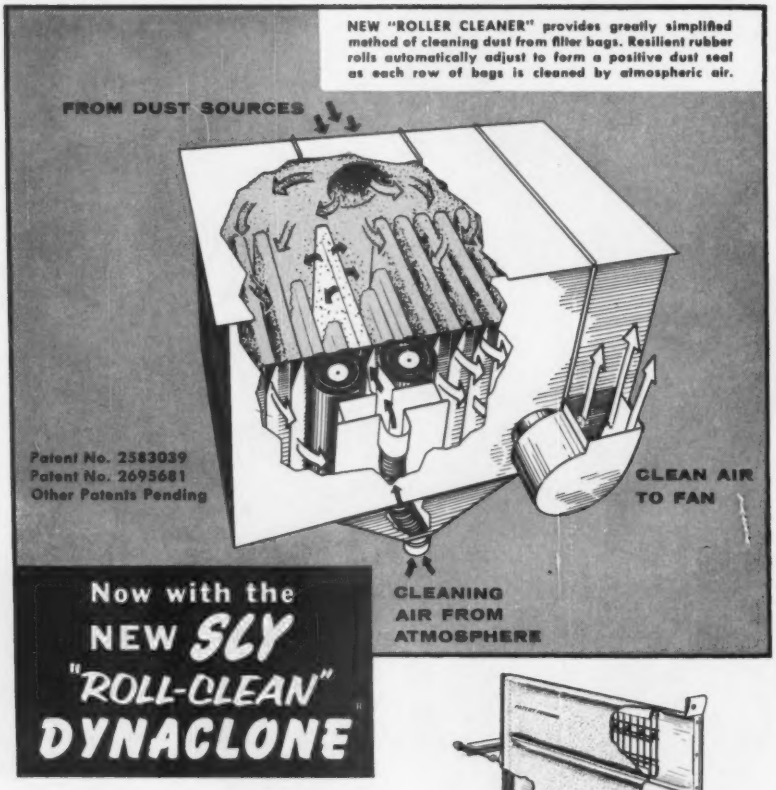
NEW "ROLLER CLEANER" provides greatly simplified method of cleaning dust from filter bags. Resilient rubber rolls automatically adjust to form a positive dust seal as each row of bags is cleaned by atmospheric air.
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Patent No. 2583039
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Other Patents Pending
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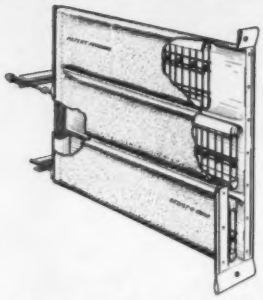
CLEANING AIR FROM ATMOSPHERE

Now with the NEW SLY "ROLL-CLEAN" DYNACLONE



As much as 3 TIMES LONGER BAG LIFE

NEW SLY "RESIST-O-WEAR" FILTER BAGS (patent pending) provide complete dust filtration with as much as three times longer life than conventional bags. This has been proved on the toughest field installations.

The new bag has three equal-size sections. Each pocket has two spacers, making a total of six per bag. Weight is distributed on three seams rather than one, minimizing strain. A special protective flap on the back end prevents abrasion from incoming dust.

Now standard in the new "Roll-Clean" Dynaclone, Sly "Resist-O-Wear" bags combine with all the other superior Dynaclone features to assure greatest dust collecting efficiency with unequalled maintenance-free service.

ALL THESE FEATURES IN ONE DUST FILTER

- New "Resist-O-Wear" bags last as much as three times longer.
- Constant suction at dust sources—complete dust collection.
- Automatically self-cleaning for continuous operation.
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- Greater filtering capacity; smaller space requirements.
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Baie Verte *(Continued)*

development work would take about two years, and construction of a 3,000 tpd mill and other facilities would require about another 18 months.

Two Uranium Mill Plans Await Contract Okays

SIGNATURE of a milling "contract" between the Atomic Energy Commission and Palangana Corp., San Antonio, leading to the erection of a major uranium mill in Duvall County, is "imminent."

A spokesman for AEC's Grand Junction operations office said the Commission and Palangana, a joint subsidiary of Columbia Southern Chemical Co., and Union Carbide Nuclear were "already in substantial agreement" on the price to be paid for uranium concentrates from the mill, which will be in the range of 750 tpd.

On Nov. 1, 1957, AEC gave the Karnes and Duvall Counties uranium area reserves of 1½-million tons of 0.25% U_3O_8, and said that milling of these reserves through to Dec. 31, 1966 could be accomplished at a rate of 750 tpd. There were apparently no competitors seeking mills in this area.

In another, "non-competitive" area, AEC confirmed that it has approved a plan, subject to financing, for the construction of a 200-tpd concentrator near Austin, Lander County, Nev., by Apex Minerals Corp.

In Austin, Apex president W. R. Noack announced that an $800,000 concentrator would be built and completed by late spring—indicating that financing had been successfully arranged. The contracts have not yet been signed with the AEC, said a Commission spokesman.

In its reserve report as of Nov. 1, 1957, AEC gave the Austin district 215,000 tons of 0.18% U_3O_8 ore. The mill, when constructed, will be Nevada's first uranium concentrator. Mr. Noack said it would serve custom shippers as well as Apex's ore reserves.

Commission spokesmen also said that solution of the Front Range, Colo. milling question, where AEC has proposed the construction of a 200 tpd facility, still awaits completion of metallurgical tests on the complex ore by the US Bureau of Mines experiment station, Salt Lake City.

Magnet Recovers Loaded Ion Exchanger Resins

A MAGNETIC SEPARATION technique to recover ion-exchange resins from slurry is being developed jointly by Dow Chemical Co. and Utah Construction Co. (San Francisco). The trick is to incorporate sufficient magnetic material into the resin to permit economically feasible recovery of the beads by magnetic means.

The project is still in the laboratory stage, says Utah Construction, will be scaled up in a pilot plant if further lab tests are as encouraging as early results. The company optimistically predicts several potential advantages of magnetic

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CASTINGS . . . DROSS . . . UP TO 1800°F!

- **Heavy Conveying Troughs** — ½" thick and heavier. Widths to 6', lengths to 500'. Easily vibrated in 1" stroke by rugged coil springs and single patented Carrier Natural-Frequency Drive.
- **Expandable Trough Sections** — Each 5' trough section attached by spring-loaded bolts through slotted holes. Sections expand independently of each other and of conveyor's structural members.
- **No Leakage** — A continuous one-piece dribble trough (not shown) mounted several inches below the conveying trough collects any fines which may leak through the conveying trough sections.
- **Replaceable Trough Sections** — New conveying trough sections easily installed. Little delay. Convenient replacement principle cuts costly down-time.
- **Heat-Resistant Materials** — Alloy and stainless steels resist warping and high-temperature scaling. Low abrasive wear due to gentle conveying action.
- **Quenching or Cooling** — Can be accomplished by direct or indirect water spray, plate-coil deck, or air.
- **Heat-Protected Drive** — Heat protection provided by heat shield, dribble trough, and flexibility of location.

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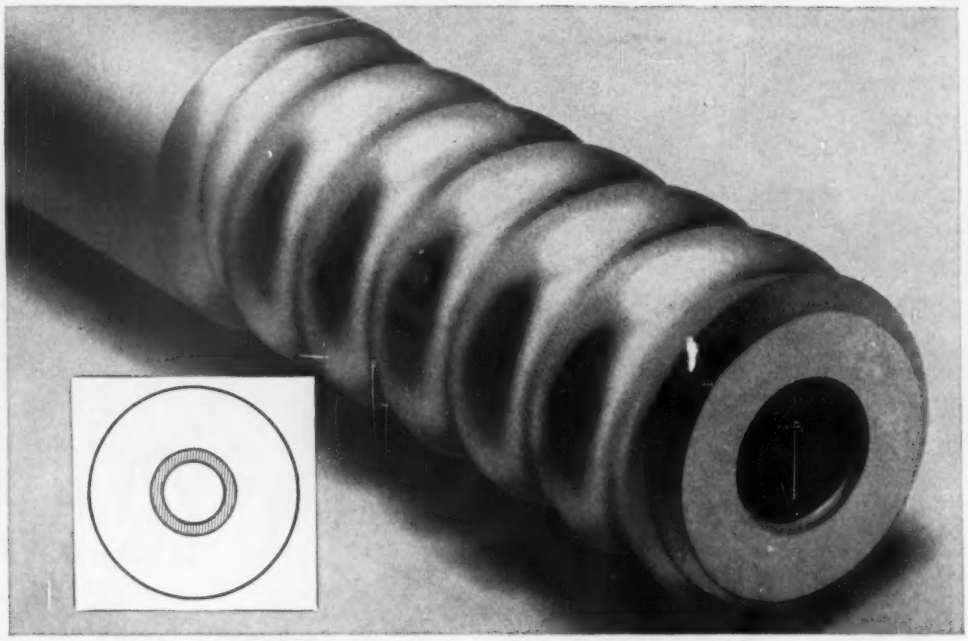
NEW ROPE THREAD MAKES UNCOUPLING EASY WITH SANDVIK COROMANT EXTENSION STEELS



Rope-Type Threads Afford No Starting Points for Fractures

Connections used in extension drill-steel must be easy to assemble and uncouple, and connections must not become weak links during the actual drilling. Sandvik Coromant's new patented rope thread makes it easy to join and uncouple the equipment . . . yet gives a solid and positive connection. The gently rounded form of this thread means trouble-free performance—eliminates common thread and coupling failures found in "saw-tooth" threads. The complete equipment—bit, rod, coupling sleeve and shank adapter—are all dependable Sandvik Coromant parts made of world-renowned Sandvik alloy steel. A further advantage to the user is that the steel can be re-threaded. Atlas Copco has special literature on Sandvik Coromant extension steel and long-hole drilling, available to you with no obligation. We suggest you write today!

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Magnet (*Continued*)

separation: it would eliminate need for thickening and clarifying solutions in ion-exchange units; it could be substituted for screening operations; it would reduce process water requirements, soluble losses and over-all capital costs.

Utah Construction hopes to perfect the magnetic separation method for use in its uranium-processing design and construction work; Dow's interest, of course, is in the potentially large market for the new resin in all types of ion-exchange processes.

Okonite Will Become A Kennecott Subsidiary

KENNECOTT COPPER CORP. and the Okonite Co. have announced plans to affiliate.

Charles R. Cox and R. Stuart Keefer, Kennecott and Okonite presidents, announced that a contract has been signed which would permit Kennecott to acquire (through a new subsidiary company) Okonite's properties, assets, and business in exchange for shares of Kennecott common stock on a share-for-share basis.

The proposal will be submitted to Okonite stockholders at a special meeting on Nov. 24, and, if approved, will take effect immediately.

Ferrophosphorus Yields Iron and Animal Feed

TENNESSEE VALLEY AUTHORITY has developed a process and a furnace to smelt ferrophosphorus into saleable iron and a slag that contains 22% citrate-soluble P_2O_5. Process, according to article by J. M. Potts and others in a recent issue of the *Journal of the Electrochemical Society*, involves smelting the ferrophosphorus, siliceous iron ore and burnt lime together in an electric furnace.

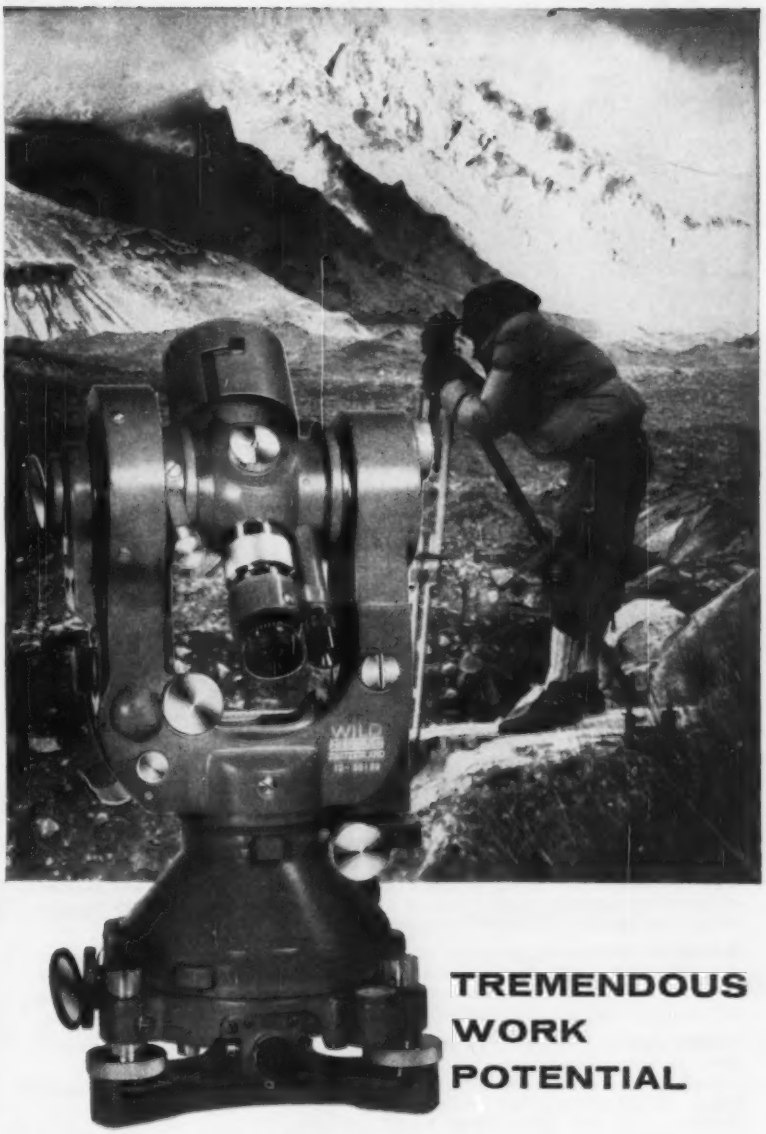
Electric furnace is lined with two-component refractory—graphite on the walls, and magnesite on the hearth. Ferrophosphorus is the slag produced in the electric smelting of phosphate rock to elemental phosphorus. Because of its high bulk density, ferrophosphorus has been used as a road metal, and has been tested as a nuclear reactor shielding material, but it has had little other market value. As used in the TVA Process, the phosphatic slag byproduct can be used as a fertilizer or as an animal feed supplement.

AEC Intensifies Nuclear Fuel Development Study

THE ATOMIC ENERGY COMMISSION invites industry and research institutes to participate in a new research and development program designed to develop advanced reactor fuel cycles for power projects.

The Fuel Cycle Development Program will cover the following major fields (ore processing is not included)—

Chemical processes related to fuel processing and reprocessing; fuel elements, materials and designs; fuel element fabrication techniques; testing and in-



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The Wild T-2 enables the operator to work rapidly, precisely and steadily under conditions that may range from equatorial to antarctic.

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Use A Sauerman DragScraper

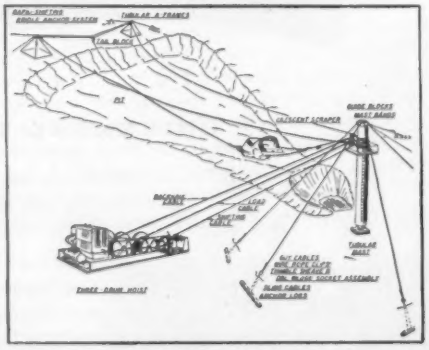
● **SOFT GROUND**—Sauerman DragScrapers work on surfaces where wheeled equipment cannot go and where mats are required to operate a dragline. The DragScraper digs and hauls its load quickly at ground level to hopper or pile. It carries a payload of two to three times its weight. You are not paying the power costs of a heavy machine with a handling capacity that is just a small portion of its weight.

● **NARROW SPACE**—A DragScraper can be operated through an opening no larger than the bucket's width. They are used successfully in culverts, sewers, tunnels, under bridges and buildings. Locations with limited space and head room . . . unworkable with other equipment . . . are handled efficiently and economically with a DragScraper.

● **DEEP WATER**—A Sauerman DragScraper will dig as much as 100 ft. below water . . . this is far below the safe depth that a dragline bucket can go without the danger of undermining and overturning the machine. Use a DragScraper for trenching, digging channels, lakes or for beach construction.

● **STEEP HILLS**—These are routine for a DragScraper. Material can be taken from anywhere on the bank. Digging from the top of the slope eliminates cave-ins—and the DragScraper gives an extra bonus by pushing additional material in front of the bucket on its way down the slope.

The Sauerman DragScraper operator and hoist is always located away from any hazardous area. It is designed for years of safe, continuous duty, handling bucket sizes up to 15-cu. yds. over spans to 1000 ft. or more.



THE SAUERMAN METHOD—*showing a basic DragScraper installation. Variations of this method are Sauerman engineered to handle the toughest digging jobs at the lowest cost per cu. yd.*

When you have a "tough-to-handle" job consult Sauerman engineers about Sauerman equipment and the Sauerman Method. Request Catalog A, also the Sauerman News and field reports.

SAUERMAN BROS., INC. 626 SO. 28th AVE. BELLWOOD, ILL.

Crescent Scrapers • Slackline and Tautline Cableways • Durolite Blocks

Fuel Study (*Continued*)

specting; and selection of proven fuel elements for multi-ton batches in full-scale reactors. Any company interested in participating should contact the Commission for details.

Hydrometals to License Electrothermal Process

A PROCESS which has been under development for some seven years has been licensed to Hydrometals, Inc. (formerly Illinois Zinc Co.). Process is a bomb process using an electric spark to ignite and react the ingredients, at up to 5,000 deg F, and up to 500 ton psi pressure. Process can be automated and run in fast, almost continuous batches.

Small amounts of ingredients are fed into the bomb, reacted and removed before (retention time about one minute) the melt has time to react with the refractory lining of the bomb.

To date, columbium, tantalum, boron, tungsten, vanadium, zirconium, titanium, beryllium and other metals that now require high cost processing have been produced cheaply and successfully in the bomb. Hydrometals will license the process and will use it themselves.

100-Ton Acid Plant Uses Heat Transfer System

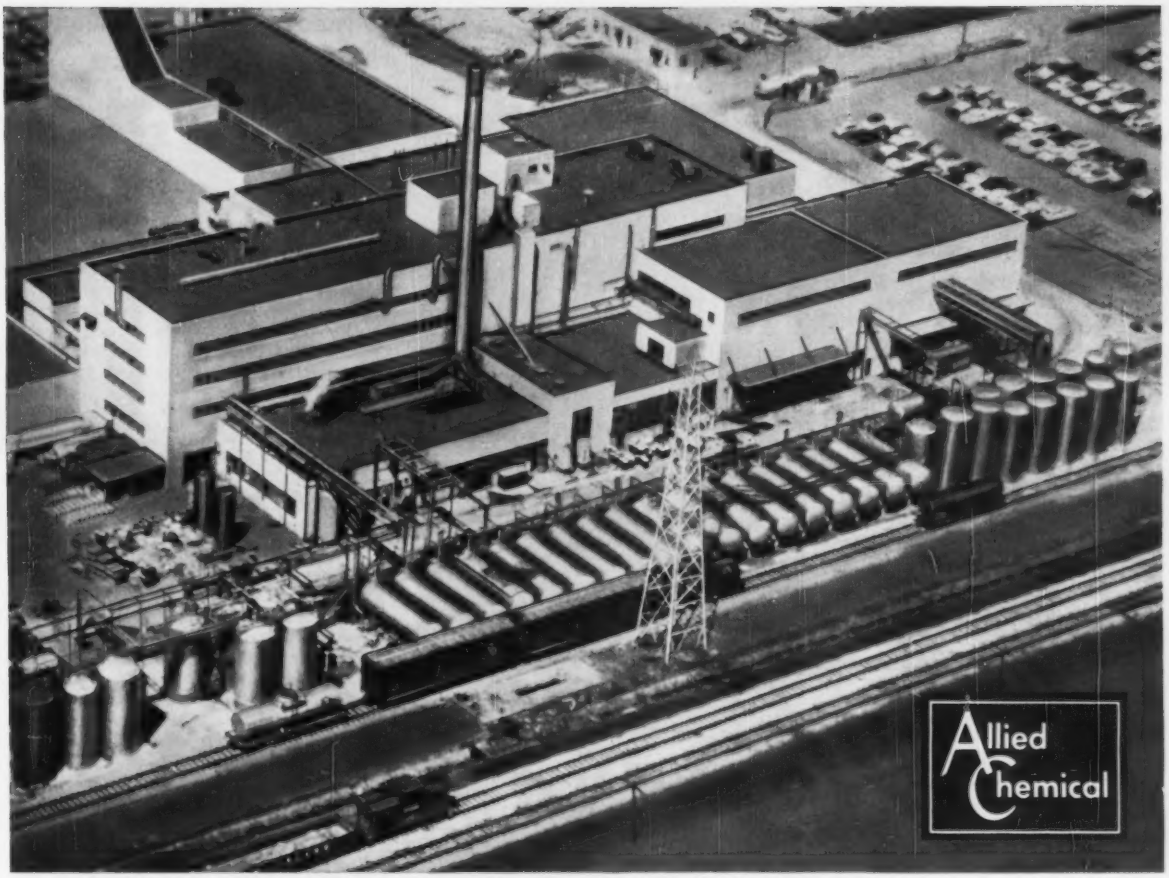
D. M. WEATHERLY CO., Atlanta, Ga., recently completed 100-tpd contact sulphuric acid plant which employs a novel heat transfer system to keep the cost down. Weatherly uses cold air, instead of hot combustion gases, to remove heat from the converter gases. Much greater available temperature difference means a two-thirds reduction in required heat transfer equipment. Along with other changes in drying and adsorption, the new flowsheet permits a simple plant layout with further savings in cost, according to *Chemical Engineering*. $350,000 cost is 20% below some engineering estimates.

AEC to Pilot Nuclear Waste Process in Idaho

THE ATOMIC ENERGY COMMISSION has announced the start of construction on a pilot plant at its National Reactor Testing Station, Idaho, for calcining high-level radioactive liquid waste products.

Fluor Corp. Ltd., Los Angeles, Calif., commenced excavation work this week on the facility as part of a general contract with the Commission for design and construction of waste disposal facilities at the Idaho atomic installation. The firm's basic contract was amended to provide $3,391,700 for construction of the plant, the total cost of which is estimated at $6-million.

The waste calcination is designed to reduce high-level liquid radioactive wastes to safer and more storable solids. Laboratory and pilot plant models demonstrated that the calcining process will reduce the volume of liquid waste to about one-seventh of its present bulk.



Polyester and Phenolic Resins Plant—Toledo, Ohio
Plastics and Coal Chemicals Division, Allied Chemical Corporation

COORDINATION COUNTS

The Plastics and Coal Chemicals Division required installation of its new Polyester and Phenolic Resins facilities without plant shutdown or interruption of other production.

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Buell Combination Cyclone-Precipitator installation at cement plant.

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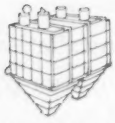
In nearly all cases, Buell dust or fume collection systems pay for themselves in just a few years. Buell "SF" Electric Precipitators provide extra collection efficiency *and* lower maintenance costs year after year, thanks to features like the exclusive high-emission, self-tensioning Spiral-ectrodes and unique Continuous Cycle Rapping. For specific information about dust collection efficiency and all three Buell systems, write for a copy of the booklet, "The Collection and Recovery of Industrial Dusts." Dept. 19-K Buell Engineering Company, Inc., 123 William Street, New York 38, N. Y.

BUELL CYCLONE



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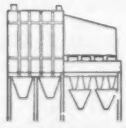

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DUST COLLECTION SYSTEMS

Nuclear Waste *(Continued)*

The new facility, capable of handling one gallon of waste per minute, will provide prototype experience for full-scale plants.

Developed by scientists of Phillips Petroleum Co. and Argonne National Laboratory, the fluidized bed calcination process is a mechanically simple means of rendering less bulky and significantly less corrosive the fission product solutions resulting from fuel element processing for recovery of unburned uranium. Work to date has indicated that fluidized bed calcining of radioactive wastes should be economically competitive with liquid storage and have less hazard potential.

IN THE U.S.

ALASKA

A report on the mineral possibilities of southeastern Alaska has been published by the U.S. Bureau of Mines. The report includes a brief history of mining in the region, description of mineral occurrences, costs of various items such as food, labor, transportation, etc., and references to other information about the region's mineral resources.

The report, Information Circular 7844 ("Southeastern Alaska's Minerals"), may be obtained from the U.S. Bureau of Mines, Publications-Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

In Los Angeles on Sept. 12, shareholders of Alaska Juneau Gold Mining Co. approved the purchase through exchange of stock of the Fletcher Aviation Corp., Rosemead, Calif. Fletcher is a maker of disposable wing tanks and in-flight refueling systems for aircraft used by the military and for agricultural dusting. Exchange of stock took place Oct. 3.

Charles J. Ver Halen Jr., Alaska Juneau president, said that a $1,245,000 Fletcher Air Force contract for drop tanks gave the aircraft firm a backlog of orders of $5-million. Ver Halen added, however, that probably the most attractive Fletcher property is the 170-acres owned at Rosemead, on the eastern outskirts of Los Angeles, which Alaska Juneau plans to develop.

As for current mining operations, Ver Halen said that the company was investigating a western Mexico property but that there were no present plans for reopening the Alaska mines.

CALIFORNIA

Lakeview Mining Co., Lakeview, Ore, is about to wind up its second season of drilling at its uranium property in the Sonora Pass area of the Sierras.

Two drills have been at work this season blocking out a commercial orebody, and some 350 ft of drifts have been driven to check drilling data. Drilling was done at the 8500-ft level. The findings have not yet been evaluated, Lakeview said.

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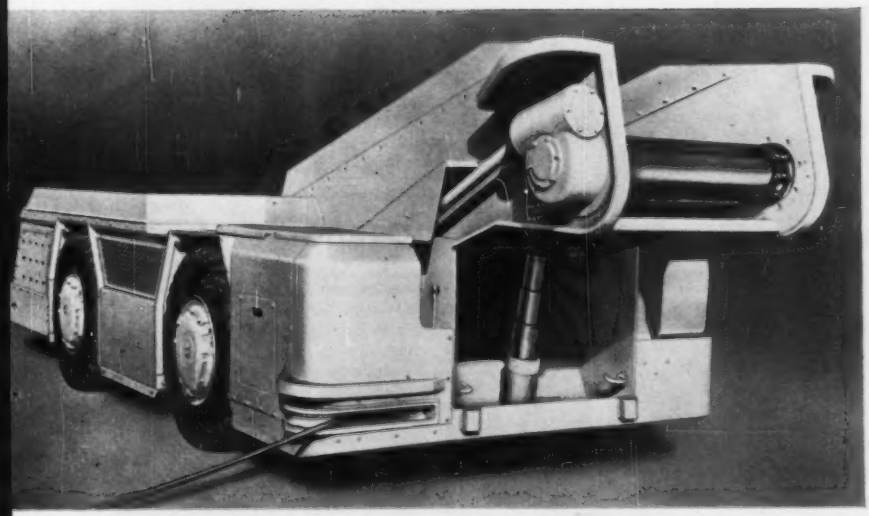

From first field tests, to sales leadership of the industry in less than six years! This truly remarkable achievement of the AC Torkar is based solidly on superior performance *in the mine* . . . single-motor simplicity, equal high torque traction on every wheel, no-fight steering, outstandingly low maintenance. Choose AC or DC drives, in Types 26, 30, 36 and 48 according to your conditions—make TORKAR your one-word shuttle car specification!

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California *(Continued)*

Plans are to process the ore at the company's $2.6-million 210 tpd mill at Lakeview.

A new company, Carrigan Mines, has been incorporated in California to work a uranium property in the Sonora Pass area six miles from the Lakeview mine. Some 9,000 ft of holes have been drilled in an attempt to evaluate the property, which covers 1,440 acres.

According to vice president Jack Buhl, a vein of autunite 1½-miles long has been outlined by the core drilling.

He said that after a geological report is prepared, an application will be made for OME (formerly DMEA) assistance.

Buhl said that up to 16 men have been working double shift at the mine. Carrigan owns its own drilling equipment.

The deepest hole, said Buhl, is 265 ft. The drilling operation is at an altitude of 7,500 ft. A logging road provides access, and a spring provides water.

Work will halt before winter sets in, probably in December. The firm hopes to start mining next Spring.

California has brought its mine safety regulations up to date, revising them for the first time since 1946.

Copies of the new regulations, recently approved by the State Industrial Safety Board, are expected to be available in November.

Effective date of the new orders was Oct. 22.

The safety regulations were rewritten by a committee of mining men representing management, labor, governmental agencies and insurance companies. Its chairman was Emory Smith of the State Division of Industrial Safety.

Among the changes made in the old regulations are tighter requirements on gassy and dusty mines and on hoisting equipment.

A. C. Blackman, chief of the Division of Industrial Safety, notes that anyone wishing a copy of the new order may get it from the State Printing Division, Documents Section, North 7th St. and Richards Blvd., Sacramento 14, for 25c plus 1c tax.

Kerr-McGee Oil Industries, Inc., recently took 2,000 acres of desert in Bern County on assignment from Patrick J. O'Hornett.

The acreage is in addition to 14,886 acres that Kerr-McGee took a year ago from Southern Pacific Land Co. Objectives are salines and other evaporites, including compounds of sodium, potassium and boron.

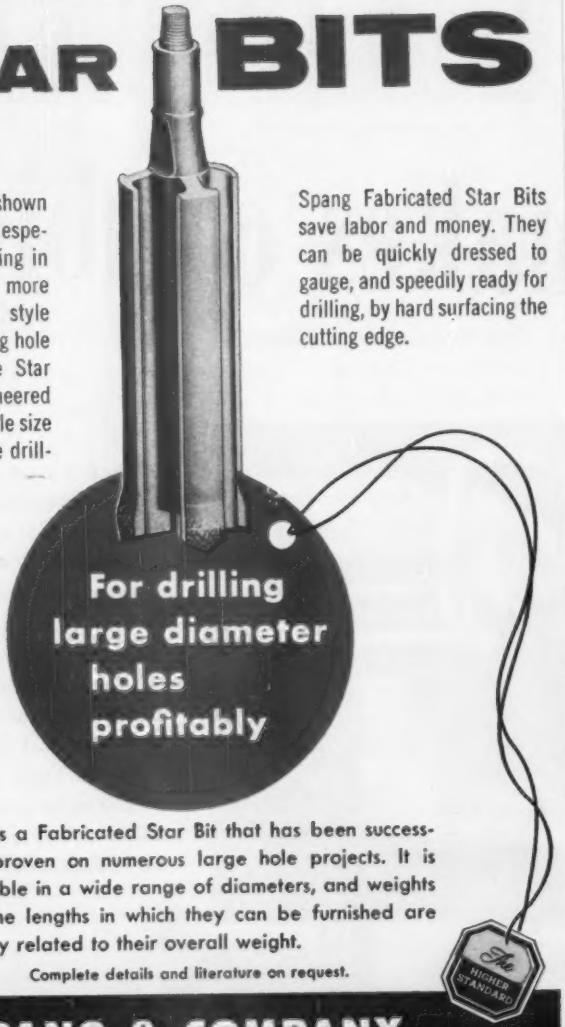
A subcommittee of the California State Assembly Interim Committee on Manufacturing, Oil and Mining met in Bakersfield last month (Sept. 28) to hear members of the Western Mining Council propose that the state pay for half the cost of a county mineralogist in every county. The individual counties would pay the other half.

Explaining the proposal, John J. Skipper, president of the Bakersfield chapter of the council, said: "Mining and prospecting have become highly technical in our days, especially with the advent of the rare earths and minerals. It requires special knowledge and training which the average miner and prospector does not have. A county mineralogist acting in the capacity of advisor, could stimulate the mining industry in every county."

FABRICATED STAR BITS

The Fabricated Star Bit shown here has been designed especially for big hole drilling in hard formations. Far more efficient than the old style spudding bit and the big hole paddle-type bit, these Star Bits are custom-engineered to suit the particular hole size and the capacity of the drilling machine used.

Spang Fabricated Star Bits save labor and money. They can be quickly dressed to gauge, and speedily ready for drilling, by hard surfacing the cutting edge.



Here is a Fabricated Star Bit that has been successfully proven on numerous large hole projects. It is available in a wide range of diameters, and weights . . . the lengths in which they can be furnished are directly related to their overall weight.

Complete details and literature on request.

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For over 60 years Manufacturers of Spang Weldless Jars and a Complete Line of Cable System Drilling and Fishing Tools for Oil and Gas Wells, Prospect Drilling and Shot Blast Holes.

COLORADO

The Shenandoah-Dives mining property near Silverton has undergone improvements and additions that should make it a continuous producer for years ahead. The rehabilitation of the large selective flotation mill 1½ miles east of Silverton has been completed, according to an announcement by Harcy-Shenandoah Corp.

One of the nation's most complete engineering classroom and laboratory buildings went into operation Sept. 10 when the fall semester began at the Colorado School of Mines. The $1-million metallurgical engineering building termed the "finest academic building for metallurgy anywhere in the country" by Mines Metallurgy Department head H. Gordon Poole, was placed in operation without a formal dedication ceremony.

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Standard Design

For drying, roasting, regenerating, dehydrating, etc. — where requirements are for a simple oxidizing atmosphere, permitting contact of combustion products with the charge.

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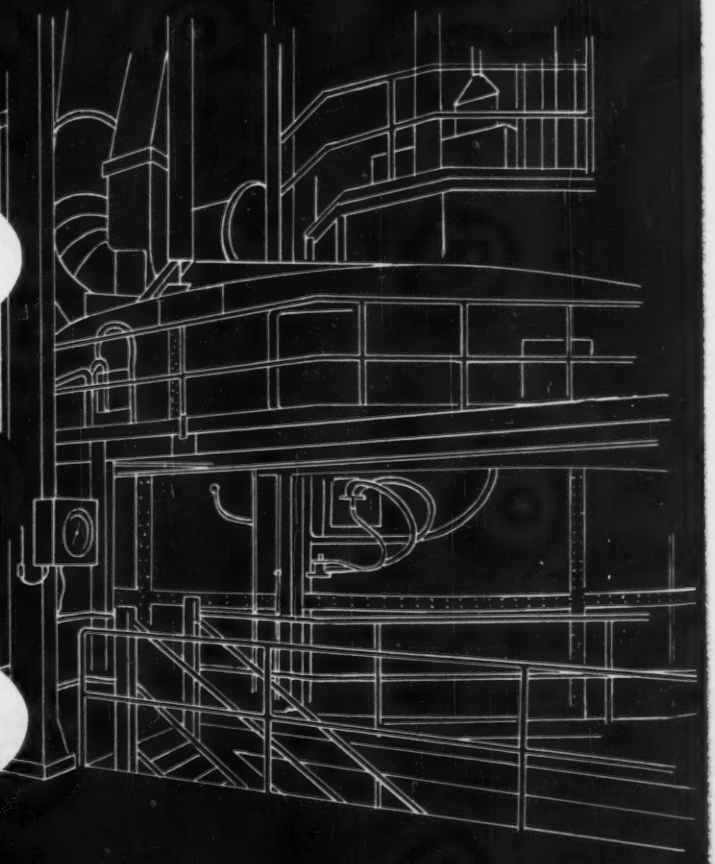
For applications when flame impingement upon materials under process is not desired. Fuel is burned in combustion chambers apart from furnace proper.

Muffle Type

For applications where combustion gases must be kept separate from reaction products.

Reduction Type

Excludes infiltration of air and permits reducing atmosphere in hearth spaces. Either solid or gaseous reductants can be used.



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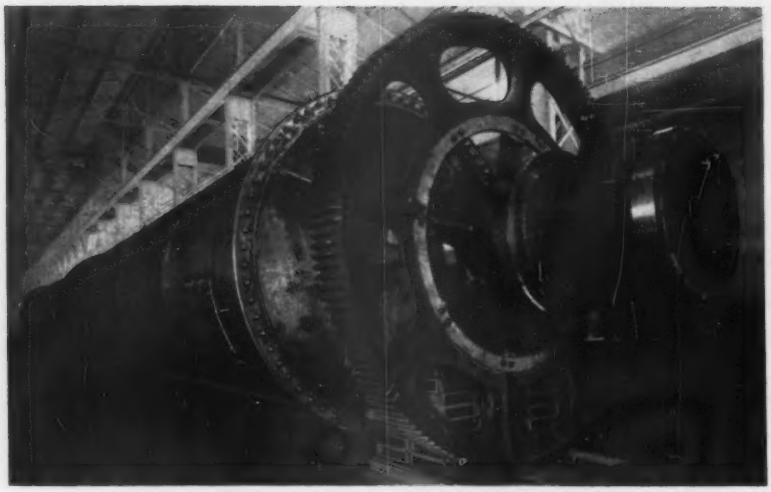

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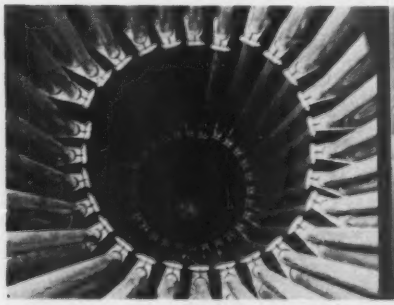
WATER-COOLED SHELL—Water is externally applied to the shell, either by sprays or by partially submerging the shell.

TUBULAR TYPE—Internal water-cooling tubes are assembled with the rotating shell, or installed as a stationary bank of tubes concentric with the shell. Alternately, the water leaving either of these tube sections may be used for supplemental spray cooling on the shell exterior.

DIRECT-CONTACT WATER—For rapid cooling from very high temperatures, water is sprayed directly on the hot material to utilize the latent heat of vaporization. Usually supplemented by secondary air cooling.

Each of these types has a particular area in which it is most economically applied. Write for further information.



Interior of a water-tube cooler. Longitudinal banks of tubes provide maximum cooling surface for minimum floor space.

Interior of partially-submerged cooler with gravity-controlled scrapers maintaining clean shell surface for high-rate heat transfer.

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Colorado *(Continued)*

mining of uranium ore in the Gateway area on Beaver Mesa, 65 miles southwest of Grand Junction. Until now, the company through its subsidiary, Flanders Mining Co., has operated as owner and lessor of its uranium interests with the mining being done by lessees.

Silver receipts at the Denver Mint, running high in recent months, were reduced to a trickle in August by the trucking strike. Mint officials said silver receipts totaled 17,144 oz worth $15,430, compared with 12,862 oz valued at $11,638 in August 1957.

A record volume of silver was received in July, totaling 1,124,661 oz worth $1,017,734, the result of the lower world price of silver which still prevails.

Gold receipts in August came to 51,655 oz valued at $1,807,929, compared with 53,597 oz worth $1,875,911 in August 1957.

Prospects for the newly opened Cameron Mine on Section 17 at Cripple Creek look bright with the discovery of a rich streak of fluorine (1.5-in. wide) that assays from 236 oz gold to the ton and 179 oz silver. The lowest assay streak ran 42 oz gold.

The rich vein is on the floor of the 100 level. Bert Bielz, manager of the mine said that the company is cleaning up the 200 level to come in under the streak. They plan to stope under it and mine as narrow as possible (to a width ranging from 14 to 18-in.).

Mine and Smelter Supply Co., Denver, has joined forces with its subsidiary company, Colorado Iron Works, and all products will be manufactured by the parent company. Albert E. Seep, president of Mine and Smelter, reports that consolidation of the sales, engineering and production departments of the two companies will result in a completely integrated organization to provide improved service to all industries.

Denver Fire Clay Co. has started construction of a laboratory for research and development of refractory products.

William O. Brandt, director of research, said the new laboratory will be operating by Dec. 1. He said it will be used to develop new products in the metallurgical field, for use in steel production plants, missiles, rockets and nuclear processing.

Grand Junction operations of the AEC has announced tentative agreement on the addition of 1,770 tpd of new ore capacity in the Gas Hills District. While contracts have yet to be signed and the deal Commission-approved in Washington, D.C., the division of ore among five principal mills built, or to be built, is believed to be firmly set.

Two new mills would be built; one by Federal Uranium Corp. at 552 tpd and the other by Union Carbide Nuclear at 492 tpd. Other mills would either be expanded or have their contracts expanded with the AEC.

Western Nuclear would be increased from a present 440-tpd rate to 845 tpd; Lucky Mc Uranium, from 825 to 1,002

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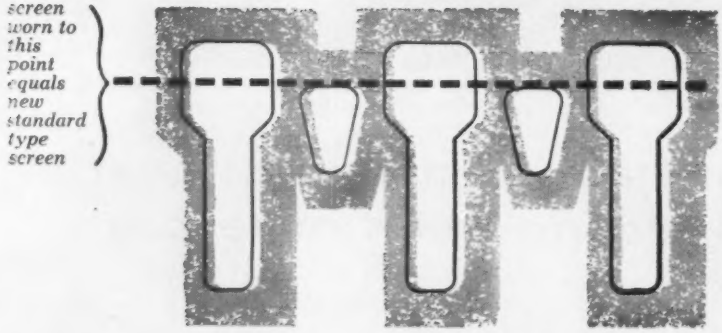

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*patent applied for

Colorado *(Continued)*

tpd; Fremont Minerals, from 550 tpd to 724 tpd.

Vitro Uranium Corp. was assigned allocation in Fremont Minerals mill; Green Mountain Uranium, an affiliate of Phelps Dodge Corp., was assigned allocation in Western Nuclear mill and to the Lucky Mc mill as proposed by those two firms. Lisbon Uranium was assigned allocation in Lucky Mc mill.

The new contracts would increase present ore run through to Dec. 31, 1966 from 1,815 tpd by 1,770 tpd to 3,585 tpd. AEC originally had announced its intention to increase capacity in the district by 1,700 tpd. The existing capacities had been generally reported at 1,650 tpd. But the AEC announcement disclosed that the mills have been running at more than the contemplated rates.

IDAHO

Lead Blossom Mining & Milling Co.'s property, consisting of two patented claims and a patented fractional claim in the Wardner area, has been consolidated with the vast west silver belt holdings of Yreka United Inc. under a merger plan approved by stockholders at a special meeting Sept. 30. Consideration for transfer of the claims was 100,000 shares of Yreka common, nonassessable stock. Yreka United now owns a large area covering many thousands of feet parallel to and immediately north of the Alhambra fault zone on which the Bunker Hill Co. is now developing and mining silver ore deposits in its Crescent mine to the east. Plans are to negotiate an agreement under which Bunker Hill will explore the Yreka holdings from a long below-sea-level tunnel which the Bunker Hill Co. has already driven about one-third of the way to connect the Crescent property with its main mine workings south of Kellogg.

Construction of Monsanto Chemical Co.'s new private highway for hauling phosphate ore from its Ballard Mine in Caribou County to its reduction plant at Soda Springs got under way early in September after right-of-way was cleared through favorable court rulings in two condemnation actions. The off-highway route is being built by Morrison-Knudsen Co. and will be ready for use about the middle of next year. It is expected to increase hauling efficiency considerably by shortening the route and reducing costs. New 100-ton haulage units, which will handle three times the payload of present highway units, will be used on the private road.

Idaho Mining & Milling Co., Inc., Lewiston has purchased the timber on the property it proposes to dredge in the Florence Basin of Idaho County and expects to log off and clear a sufficient area along Meadow Creek this fall to permit installation of a floating dredge next spring. Logging operations will be carried on in advance of dredging along the entire 24 miles of creek bed which the company owns in the area.

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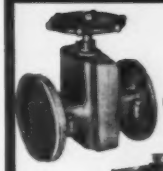

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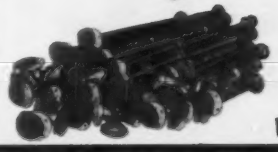

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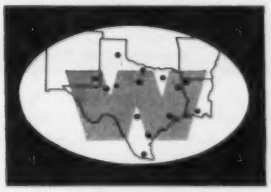
Extra filtration and shut-off valve in fuel system.

Heavy duty, 12-volt electrical system with glow plugs and fuse blocks.



Diesel-Powered 'JEEP'® Truck

combines safety and economy

APPROVED BY U. S. BUREAU OF MINES • HUNDREDS IN USE

The inherent economy and clean-burning characteristics of the 180-DLC Waukesha Diesel Engine—plus numerous safety features—have made this modified Jeep Truck a favorite in non-coal mines. Designed and constructed from stock parts by Waukesha Sales & Service, Inc.

® T. M. Reg., Willys Motors, Inc., Toledo, Ohio

for information, write:
WAUKESHA SALES & SERVICE, Inc.
P. O. Box 546 • Hobbs, N. Mex.

This impressive installation at Kiruna, Sweden, demonstrates a major benefit of ASEA Multi-Rope Friction Hoists: *low initial installation cost.*

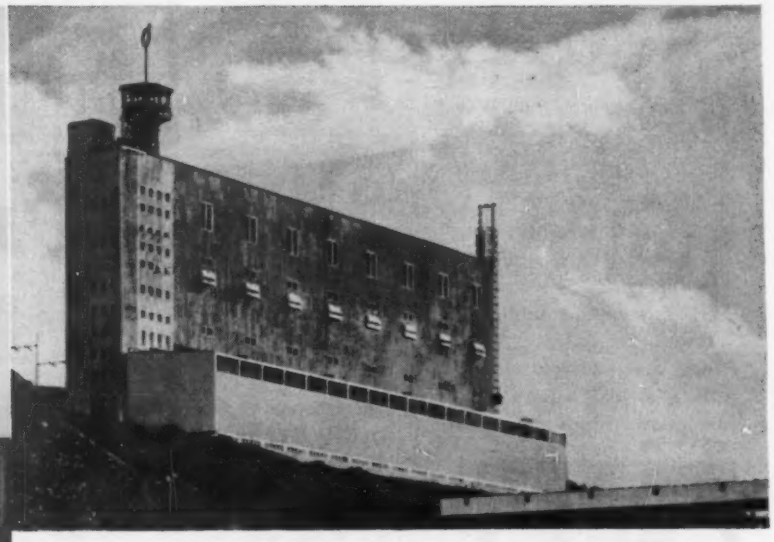
Each of these ASEA Hoists has a skipload of 22 tons and is designed for a depth of 1500 feet, maximum speed 2200 feet per minute.

At Kiruna, as in mining operations throughout the world, ASEA Multi-Rope Hoists prove less costly to operate, safer, and they reduce rope wear.

In the U.S. these advantages may be seen in the ASEA installations of National Potash Co. and The Cleveland-Cliffs Iron Company.

9 HOISTS IN ONE HEAD FRAME

Total capacity: 4600 tons per hour



FULLY AUTOMATIC, the ASEA Hoists at Kiruna eliminate the employment of hoist men.
At U.S. wage rates, assuming two-shift operation, this would mean a saving of about $30,000 yearly for each hoist!

Write for illustrated literature on ASEA Multi-Rope Friction-Drive Mine Hoists.

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World pioneer in electrical products for industry

U. S. Sales and Service:

ASEA ELECTRIC, INC.
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500 FIFTH AVENUE, NEW YORK 36, N. Y.

Idaho *(Continued)*

Stibnite, Idaho, in Valley County—once the nation's production center of antimony—has been reduced to less than a ghost town. The once-bustling little community of more than 1,000 population has virtually disappeared back into its forest wilderness setting—a victim of low-priced foreign imports of antimony. Just a few years ago, Bradley Mining Co.'s Yellow Pine mining, milling and smelting plant—the sole economic support of the community—was producing 90% of the domestic antimony supply, along with considerable by-product values in gold and tungsten. Mining operations were suspended in mid-1952 because excessive imports had destroyed the market for antimony. After efforts to maintain the plant and camp through custom-smelting contracts proved unsuccessful, the mine and mill were dismantled in 1956 and salvage of the smelter was begun in 1957. For more than a year the entire plant and camp have been on a caretaker basis. On Sept. 11 of this year an auction was held to dispose of more than $1-million worth of remaining mine, mill and plant equipment and supplies. The last of 200 housing units were to be disposed of before Oct. 1. After that there will be no more Stibnite.

Exploratory diamond drilling into the northerly portion of the Cortez Silver-Lead Co. property east of Mullan is now under way from the 2,000-level of the Silver Mountain shaft. Objective of the southerly drill hole that is being run from the west face of the Silver Mountain west drift is to explore an area which has a geological setting very similar to that in which the rich Lucky-Friday orebody was found. The work is being done under a recently concluded agreement which provides for a profit-sharing split of 20% to Cortez, 20% to Silver Mountain Lead Mines Co. and 30% each to Hecla Mining Co. and the Bunker Hill Co., which have jointly financed the Silver Mountain deep development project.

Federal Uranium Corp. has started sinking a new 1,000-ft shaft at the Conjecture silver property in the Bayview District of Bonner County. Erection of a 75-ft steel headframe above the 44-ft shaft collar of heavy concrete was completed in mid-September and sinking operations were started shortly thereafter on an around-the-clock, six-day-week schedule. Plans are to establish one working level at the 624-ft horizon to connect with the 700-level workings of the old inclined shaft some 500 ft up the canyon. The new exploration and development level will be at 945 ft.

Federal is financing the project under a 50-50 profit sharing agreement with Conjecture Mines Inc. During the past year it has deepened the old incline 200 ft to the 700 level and found considerable improvement in the quality and quantity of ore on the lower horizon. Further improvement is anticipated on the new deep level since the ore-bearing structure will be in the more favorable St. Regis formation at the depth.

Whether its coarse, fine grain, solid or broken formation EVERY diamond drill bit designed by J. K. Smit has behind it, hundreds of miles of actual field drilling tests.

EVERY diamond is of uniform size, shape and structure throughout; hand picked from thousands with a skill born of 68 years in this highly specialized business.

This means LOWEST footage costs, LONGEST bit life, and HIGHEST SALVAGE.

J. K. Smit's service and experience in manufacturing and using Diamond Drill Bits is as available to you as your telephone.

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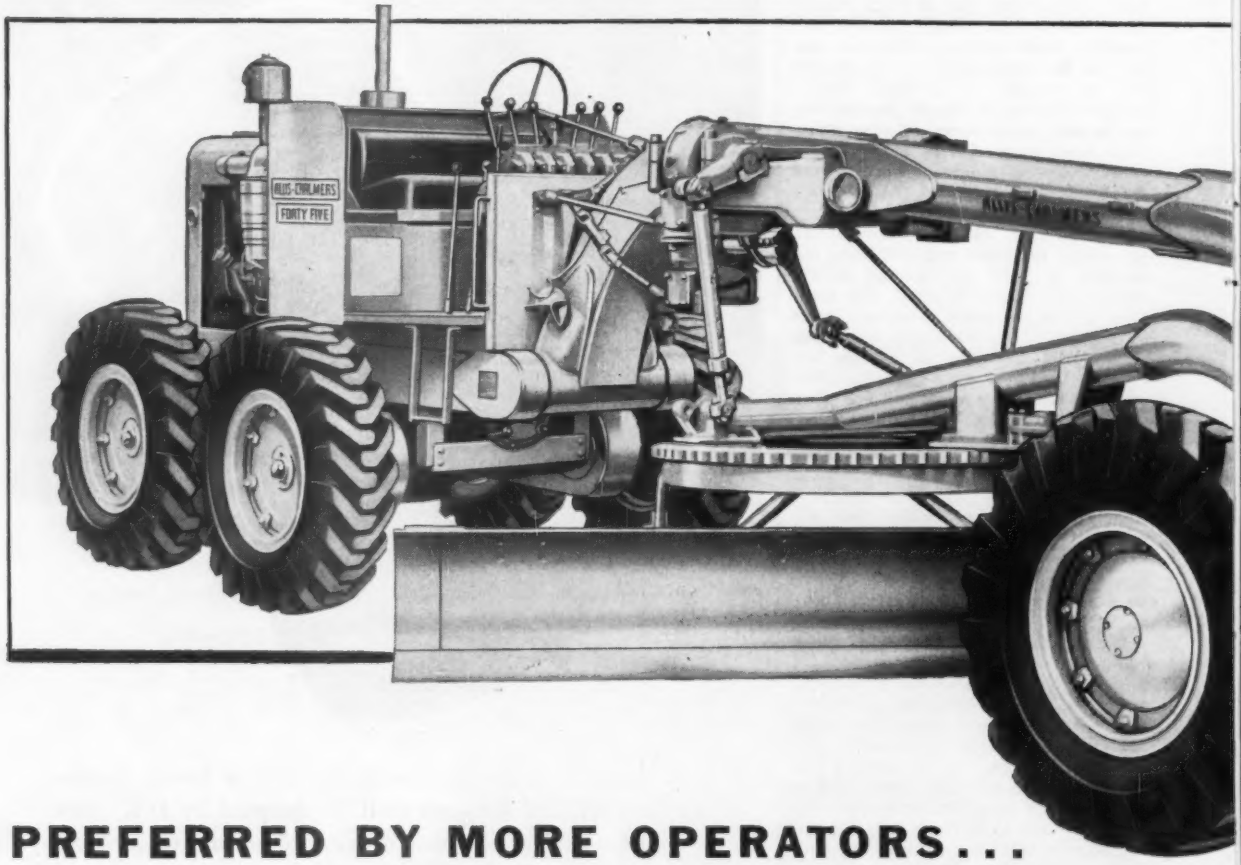
For consistently tough jobs, compare with any other heavy-duty motor grader



PREFERRED BY MORE OPERATORS... BOUGHT BY MORE USERS EVERY DAY

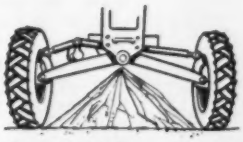
The FORTY FIVE has the power, weight, traction and speeds you need for high-production grading. Superior stability and precision control give you deep precision cuts or smooth finishes. The FORTY FIVE is built to take the shocks and strains of heavy-duty service — and to keep production steady. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

Look ahead... *move ahead* ...and stay ahead with **ALLIS-CHALMERS**

Allis-Chalmers FORTY-FIVE performance

- 120 brake hp
- 6 forward speeds to 20.6 mph
- 3 reverse speeds to 7.0 mph
- 23,800 lb approx.

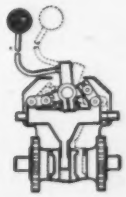
Advantages that mean more production . . . less maintenance . . . easier and better operation



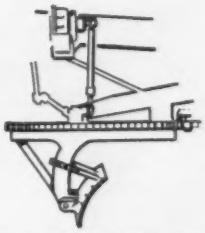
Extra high axle and throat clearance means bigger loads at the blade.

The ROLL-AWAY moldboard rolls dirt, gives more performance per horsepower, more production per gallon.

Fully enclosed power steering — easy control under all conditions.

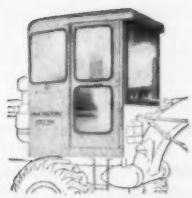


Toggle-type controls are exclusive with Allis-Chalmers.

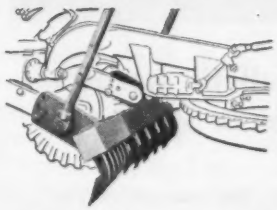


Front-mounted lift cases eliminate long shafts that twist under loads.

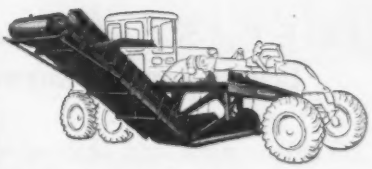
Matched attachments and accessories make it a year-round producer



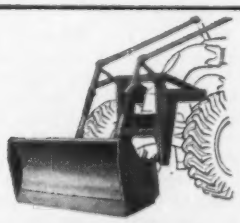
All-steel, stand-up cab



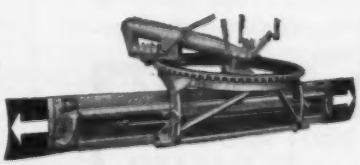
11-tooth, V-type scarifier



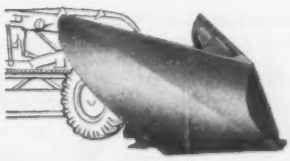
Hancock elevator



8-foot bulldozer



Hydraulic, shiftable moldboard

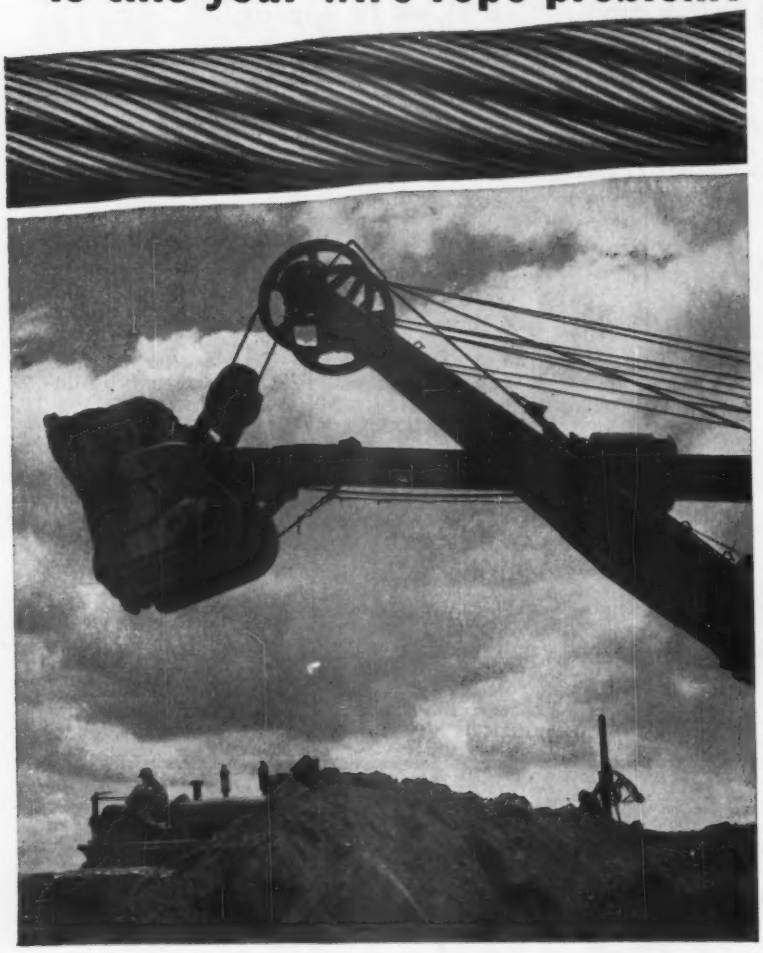


V-type snowplow

ROLL-AWAY is an Allis-Chalmers trademark.

bending fatigue...

is this your wire rope problem?



FREE Red-Strand Service Bulletin No. 105 brings you the answer you're after!

Do broken wires start showing up much too soon after you put a new wire rope into use? If so, costly bending fatigue is probably the explanation. Fortunately much of the expense it causes can be eliminated by following the simple procedures explained in Red-Strand Wire Rope Service Bulletin No. 105. This is one of a series devised to help wire rope users get better service without spending more money. Copies are sent on request. Write H. K. Porter Company, Inc.—Leschen Wire Rope Division, St. Louis 12, Mo.

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WIRE ROPE

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Idaho *(Continued)*

More than two miles of bulldozing work has been completed by Capital-Seaboard Corp. on its Long Dike cobalt prospect in the Blackbird Mining District of Lemhi County since a $62,500 OME (formerly DMEA) exploration project was started early in August. Some promising mineralization has been disclosed and a soil-sampling program is being carried out this fall, in preparation for some diamond drilling exploration next Spring.

Discovery of a substantial deposit of good-grade uranium ore in the East Basin creek area of Custer County northeast of Stanley was reported recently to Western Fluorite Mining Co. The ore is uraninite and pitchblende, and occurs in a 4-ft thick horizontal bed which has been exposed over a width of 75 ft. Length of the ore bed has not yet been determined. It lies under overburden as much as 75 ft thick in places. Operations to date have been largely confined to stripping the deposit in the hope of getting out about 500 tons of ore for shipping before winter weather closes down the property. Western Fluorite is working a 15-claim property owned by Keith and Alice Evans of Ketchum. Other firms reported to be active in the area are Phillips Petroleum Co., which made a shipment from the Little Bill claims earlier this summer, Sidney Mining Co., Rare Metals Corp. of America and the Alta Corp.

Shasta Mining Co. has stockpiled nearly 3,000 tons of iron ore since taking over operation of the old E. L. Jones and Associates property on Iron Mountain in Washington County shortly after its incorporation last June. One stockpile of more than 1,000 tons of finely powdered ore is consigned to the Oregon Portland Cement plant at Lime for shipment as needed. Another 1,800 tons or more is stored along the Union Pacific right-of way at Weiser for shipment to steel mills. The new company completed a substantial exploratory drilling program at the property this summer but was unsuccessful in finding the hoped-for, deep underground deposits of rich ore.

Salmon River Scheelite Corp. is continuing exploration work at its tungsten property on Thompson Creek Canyon in Custer County despite the fact that the current outlook for profitable sales of tungsten concentrates is rather grim. Present objective is the completion of a $90,000 OME(DMEA) contract approved in June 1957. Whether operations can be continued beyond that will depend entirely on price and market conditions, officials said. Now in progress is an easterly crosscut from the ore shoot on the Tungsten Jim claim, in which a 150,000 tons of ore have been blocked out, toward a substantial width of commercial grade ore disclosed this spring by diamond drilling on the adjoining Nelvinny claim. Crosscut will open the new vein at a depth of about 600 ft below the surface.

Two central Idaho mining operations suffered heavy fire losses over Labor Day

weekend. The Apache mill in Blaine County west of Hailey was completely destroyed in a forest fire which swept out of control up Bullion gulch, resulting in a loss estimated at $250,000. In Custer County, at Idaho Custer Silver-Lead Mines's Livingston property, a blaze which started in a defective electric generator consumed much of the surface plant and cut off power to the underground pumps, causing some equipment to be temporarily flooded. The loss of more than $50,000 was partly covered by insurance.

Salmon River Uranium Development, Inc. has made good progress in building a thorium concentrating plant near Salmon. Mill machinery, power and water facilities have all been installed and tested.

The mill building, pump house, and other necessary buildings are under construction and will soon be completed. The mill has a capacity of 100 tpd and has been designed in such a manner that, if needed, the capacity can be expanded.

ILLINOIS

Resumption of a five-day work week for Alcoa mill employees is announced by Walter S. Skeels, works manager at the company's Rosiclare plant. Operation has been on a four-day schedule since June.

IRON COUNTRY

A contract for $1,615,213 has been awarded for the construction of a research laboratory at Fort Snelling to be operated by the Bureau of Mines. The last Congress authorized an expenditure of $1,719,000 for this purpose.

The annual report of St. Louis County mine inspector shows that 124 mines of a total 234 were in operation during 1957. 47,980,351 tons of ore were shipped from the County's open pit mines and 2,112,924 tons from underground mines, a ratio of about 22.7:1. Stripping amounted to 50,444,365 cubic yd. Largest production (7,254,225 tons) came from Oliver Iron Mining Div.'s Rouchleau group at Virginia.

Pickands, Mather & Co. has closed the Zenith underground mine at Ely, which it has operated since 1920. The mine was opened in 1892 by the Zenith Mining Co. It has produced 20,306,297 tons up to this season, but had been idle for four months before being permanently closed. About 270 men are affected. The only operating mine in Ely at present is the Pioneer underground mine of Oliver Iron Mining Div. The Pioneer had about 6-million tons remaining at the opening of the 1958 season, has been producing between 750,000 and 800,000 tons per year and has a total production record, through 1957, of about 34.5-million tons.

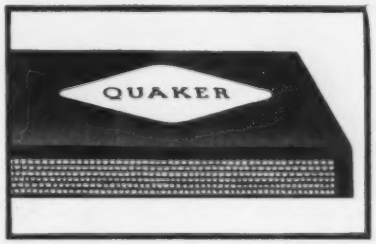
Bear Creek Mining Co. is attempting to

Quaker conveyor belting installation used in ore mining.

MORE TONS PER HOUR, PER DOLLAR
Quaker conveyor belting has high abrasive resistance

Quaker conveyor belting is especially designed for carrying highly abrasive materials such as mine ores, trap rock, shales, and machined metal parts. The heavy-duty cover resists sharp abrasion and extra wear caused by material caught between boot pulley and belt. Quaker belting is resilient—engineered to withstand the high flexing of short centers and the tension of long hauls. It is constructed with extra-tough covers and carcass to resist severe impact.

Your Quaker industrial distributor is ready to give you the full story, and to offer valuable assistance on *all* problems involving industrial rubber products.



Cross-section Quaker No. 1 grade conveyor belt; 6-ply N-50 heavy cotton-nylon fabric, skim-coated between plies.

FOR FREE ILLUSTRATED CATALOG

on Quaker belting, containing information on performance, specifications, and sizes, write to QUAKER RUBBER DIVISION, H. K. PORTER COMPANY, INC.; Phila. 24, Pa., or Pittsburg, California.

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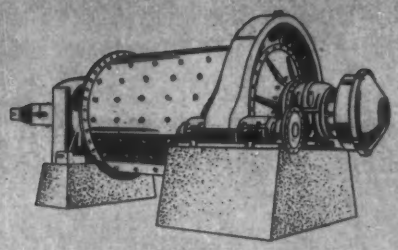
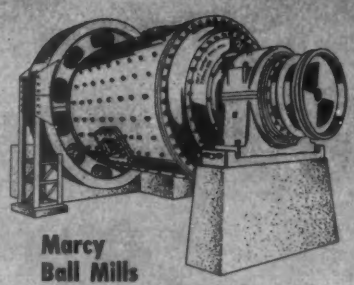
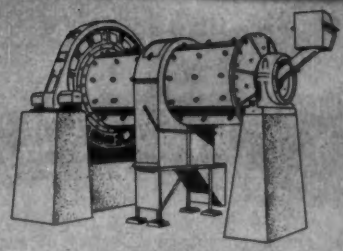


Marcy Rod Mills



Marcy Ball Mills



Marcy CPD Rod Mills

"No Compromise with Quality*"

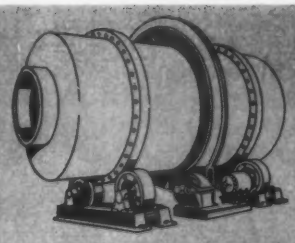
Your assurance of

- **low net-cost-per-ton production**
- **long operating life**

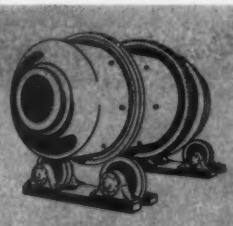
* When Mine and Smelter started manufacturing Marcy Mills, 45 years ago, it established a policy of "No Compromise with Quality." That's why Marcy Mills have earned a worldwide reputation for dependable operation and economical grinding.

Now that the Colorado Iron Works Company has been merged with Mine and Smelter, the complete line of products shown here is available from one, integrated source . . . and, manufactured with the continuing policy of "No Compromise with Quality."

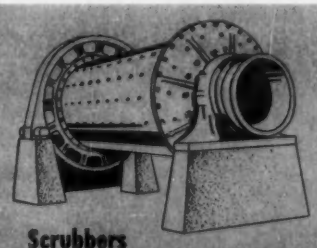
Burt Filters



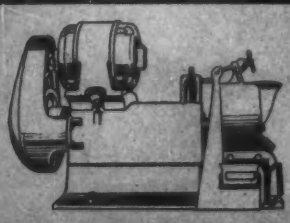
Fusion Furnaces



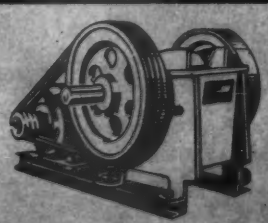
Leaching Drums



Scrubbers



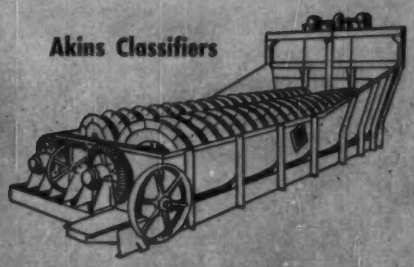
Massco-McCool Pulverizer



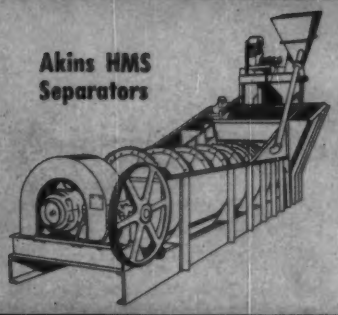
Massco Lab Jaw Crusher

Licensed Manufacturers and Sales Agents in Canada, Australia, Sweden, England and South Africa.

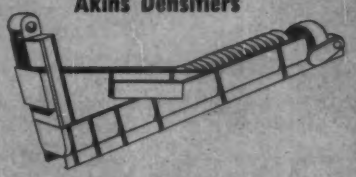
Sales Agents in Chile, Philippine Islands, Japan, New York City (for Continental Europe), and in the principal cities of the United States.



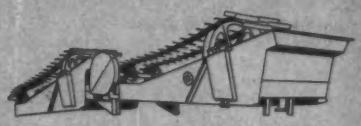
Akins Classifiers



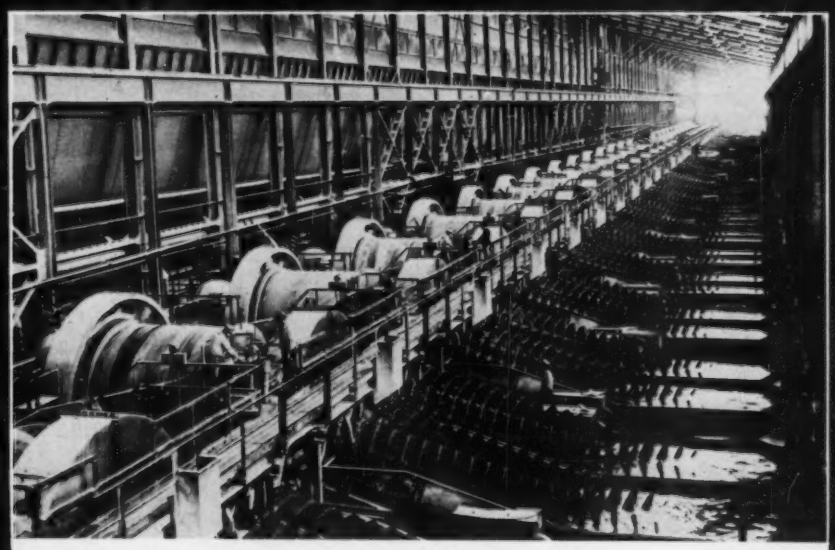
Akins HMS Separators



Akins Densifiers



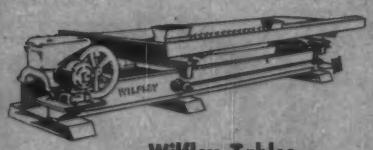
Esperanza Drag Classifiers



28 Marcys . . . 56 Akins
Working together for 15 years

This installation, in a large copper mill, is typical of that *quality* performance . . . 28 Marcy 10′ x 10′ Grate Discharge Ball Mills and 56, 54″ Akins Duplex Classifiers have been giving dependable production, with minimum maintenance, for over 15 years.

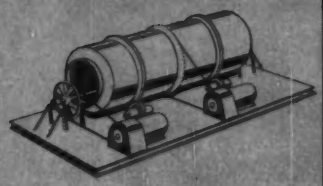
Skinner Roasters and Dryers



Wilfley Tables

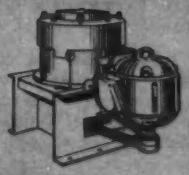
Massco-Grigsby Rubber Pinch Valves

Marcy Pulp Density Scale

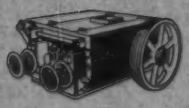


Pug Mills

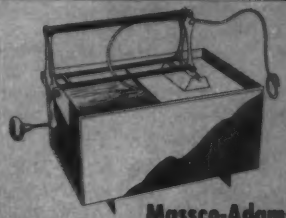
Vezin Sampler



Massco Gy-Roll Reduction Crusher



Lab Crushing Rolls



Massco-Adams Reagent Feeder

Manufacturing Division

THE MINE AND SMELTER SUPPLY CO.

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EL PASO
P. O. BOX 1162

1700-Ft Air Shaft Reopens the Big Five . . . .

REBIRTH of the historic Clear Creek area, in the Idaho Springs-Central City section of Colorado will be accomplished in the near future as a result of the work of Clear Creek Mining Co., which recently drilled a 1700-ft air shaft into an abandoned tunnel to open the old workings.

The old Big Five tunnel, a two-mile access which was planned to open into the Lake orebody, the Crown Point-Virginia, the Doves Nest, Edgar, Shafter, Belman and the Fulton was abandoned because it could not be ventilated enough to permit mining operations.

Several months ago, Alfred G. Hoyl and Paul L. Goddard, of Contract Engineering Co., Denver, interested Beaver Lodge Uranium Mines Ltd. in reopening the Big Five and going after the ore left in the area. The British Columbia firm formed, with Contract Engineering, the Clear Creek firm and began clearing the tunnel of cave-ins to check the values.

The 1700-ft, 16-in. hole, driven by Franklin & Perry drilling company, who sub-contracted from Minerals Engineering Co., broke the roof of a side drift off the Big Five tunnel only 12 ft from tunnel center. The side drift is about 1½ miles from the portal and Big Five extends another half mile beyond the new exhaust shaft.

Clear Creek officials say that a mill will probably be built in the near future to handle the ores which may be forthcoming from the deep veins. One spokesman listed, as potential products, lead, zinc, gold, silver, copper, mica, beryl, feldspar, and iron.

Iron Country *(Continued)*

obtain a lease from the state of Michigan permitting it to search for, and possibly mine, copper in the Porcupine Mountains State Park on the Lake Superior shore line about 10 miles west of Silver City. A petition is being circulated endorsing the proposal.

One of Michigan's oldest iron ore mines, the Vulcan mine at Vulcan, east of Iron Mountain, was put to a new use the past summer. It was opened in 1872 and has been idle since 1945. It was reopened as the Iron Mountain mine and used to give tourists an idea of what an underground mine is like. A large open stope was one of the points of interest.

Mauthe Mining Co. at Ironwood on the Gogebic range, Pickands, Mather & Co. operators, has resumed production at the Newport and Geneva mines.

Michigan at present is in sixth place as a copper producer. Its output of 58,000 tons in 1957 was exceeded by Arizona, Utah, Montana, Nevada and New Mexico.

Wisconsin's Gov. Vernon W. Thompson, speaking at an industrial development conference at Rice Lake, predicted that eventually there will be three or four taconite mining operations in northern Wisconsin. He said some of them would be larger than the $50-million plant planned by the Ashland Mining Co. in the Butternut area. Taconite resources represent the greatest opportunity for northwestern Wisconsin, he said.

The Northern Pacific R.R. has put an 1,800-hp diesel electric locomotive into service on the Cuyuna range. N.P. also has new 70-ton ore cars in use.

A new 689-ft long, 24,000-ton-capacity ore carrier is being built for the Interlake Steamship Co. Known now as Hull 302, the keel laying took place June 25 at the Great Lakes Engineering Works shipyard on the Detroit River.

On Sept. 24, 23 hours after clearing the Sault Ste. Marie locks, the new 729-ft, 25,000-ton-capacity ore carrier, "Edmund Fitzgerald", arrived at the Silver Bay harbor to take on her first cargo — 20,000 tons of taconite pellets from Reserve Mining Co. Conveyor belts loaded the ship in 5½ hours, a little longer than future loadings are expected to require. The new ore carrier belongs to the Columbia Transportation Division of Oglebay Norton & Co. She has a crew of 35 men and can make 16½ miles an hour when loaded and 17½ miles per hour light.

MONTANA

The Strawberry-Keystone gold-tungsten property in the Pony mining district of Madison County is the subject of Information Circular 24 now ready for distribution by the Montana Bureau of Mines and Geology, Butte.

Written by Rolland R. Reid, formerly with the Montana Bureau of Mines and Geology and now on the faculty of the University of Idaho, Moscow, the report is the result of intensive geologic mapping of the Tobacco Root area during the summers of 1954, 1955, and 1956.

This circular is available free of charge by writing to or calling at the offices of the Montana Bureau of Mines and Geology, Room 203-B Main Hall, Montana School of Mines, Butte.

Montana's Land Board has decided to ask the State Bureau of Mines and Geology to inspect an eastern Cascade County area where a prospector claims to have found uranium in commercial quantity.

The board action was taken after receipt of Emmet Odegard's request that his two uranium prospecting leases on 320 acres of land be exchanged for a permanent operating lease.

NEVADA

Isbell Construction Co. has completed the removal of 1-million yd of overburden for Manganese, Inc. at its Three Kids mine site in Clark County. As a

ALLIS-CHALMERS

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NEW brochure of ideas for modernizing

This booklet is based on the premise that modernization can start anywhere in your plant. It can be a single machine or operation . . . a better way of getting variable speed . . . a faster way to braze . . . or a newly available replacement. In fact, this type of updating is far more common than the sweeping change.

Get a copy of "59 ideas for modernization in '59" from your nearby A-C office or write Allis-Chalmers, Industries Group, Milwaukee 1, Wisconsin.

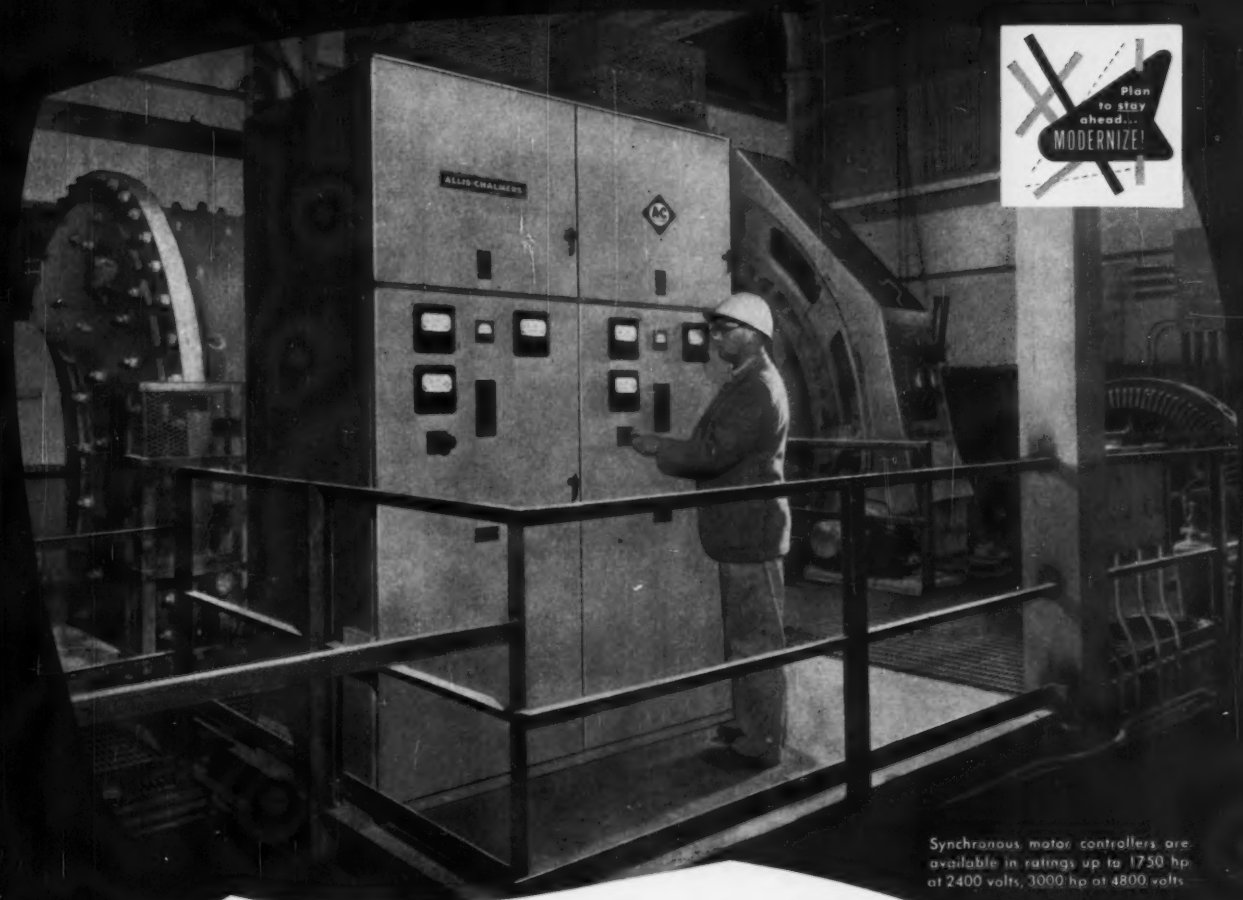
Examples of updating!

New motor development may eliminate premiums you've been paying for specially protected motors.

Electrical modernization includes placing substations close to machines being served.

ALLIS-CHALMERS

A-5850



Synchronous motor controllers are available in ratings up to 1750 hp at 2400 volts, 3000 hp at 4800 volts.

Here's synchronous motor control matched to grinding mill requirements

DESIGN of proper control requires a knowledge of both motor and driven machine. Allis-Chalmers designs and builds both grinding mills and synchronous motors. Who, then, is in a better position to design control for grinding mill applications?

When you specify Allis-Chalmers, you can be sure the control circuit is designed to reduce costly down time. Mill-matching is the answer to difficult starting, acceleration, synchronization, and motor protection problems.

For more information about Allis-Chalmers synchronous motor control for any grinding mill application, call your nearby A-C office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Features

- Current limiting fuses clear short circuit in less than ½ cycle.
- Polarized automatic field application and field failure current relay provide complete field protection.
- Temperature compensated overload relay assures adequate stator protection.
- Instantaneous or time delay undervoltage protection available.
- Automatic inching available for quick, accurate, convenient spotting.
- Enclosures: NEMA 1 gasketed or NEMA 5 dust-tight.

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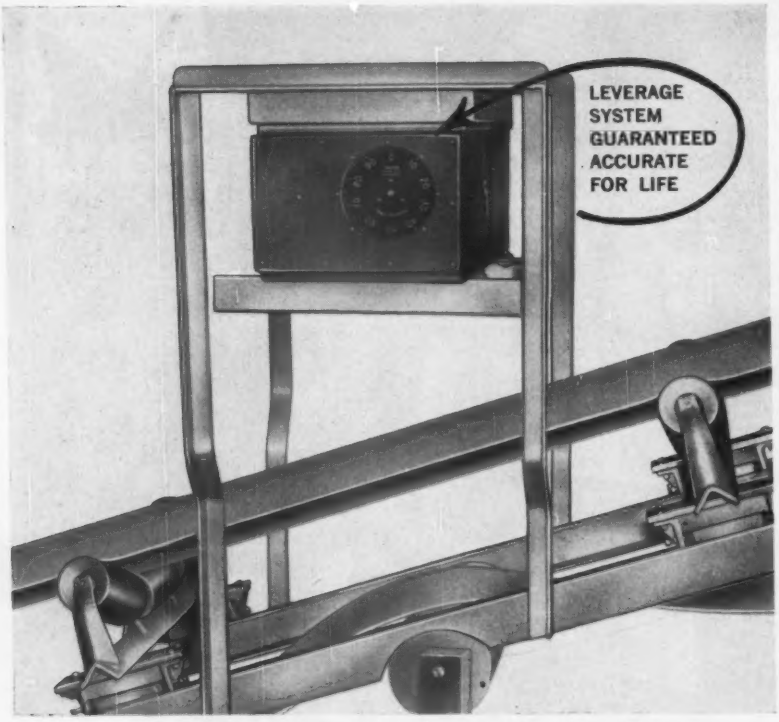
A-5763

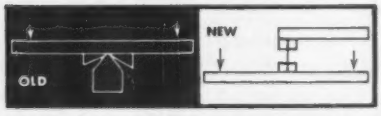


New Totalizing Scale Retains Its High Accuracy

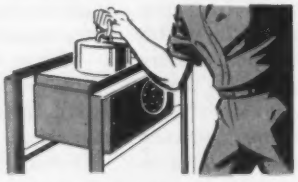
Thayer Inventory Scale fits over any conveyor — continuously weighs material passing thru

A new type continuous inventory scale is being used for refractories, mining, fertilizer batching and other rugged operations where maintenance is usually a problem.

The scale assembly fits over level or inclined conveyors at any desired location. Pneumatic or electro-mechanical controls provide remote reading. The scale weighs the moving belt and material on it, deducting the tare weight of the belt itself. Thayer Scales of 100 lbs. or 300 tons per hour capacity are available.



Exclusive Thayer Plate Leverage System is *guaranteed accurate* for the life of the scale. There are no knife-edge pivots to wear down. Neither dirt nor vibration can affect its high accuracy. Thayer Scales are unsurpassed for reliability under rugged conditions where maintenance is infrequent.



Recalibrate linearly with a direct setting by just placing a known weight on the scale platform. The endless belt is not disturbed. **No chains** or involved calculations are required. Setting is positive, accurate and long lasting.

Write us about any problems you have in bulk weighing for inventory or batching purposes.

*THE THAYER SYSTEM OF PROCESS CONTROL BY WEIGHT

THE Thayer SCALE

AUTOWEIGHTION

THAYER SCALE CORP., 14 Thayer Park, Pembroke, Mass.

Nevada *(Continued)*

result, new ore is now available for the next several months. A year ago the company was contemplating a shutdown of operations due to depleted ore supplies, but 4,300 ft of drill holes revealed the presence of additional bodies, which assure continuation of work until early next year.

Apex Minerals Corp.'s Uranium ore shipments from its mine near Austin continue to show high values, according to a recent report from the Vitro Uranium Co. plant at Salt Lake City. Four carloads shipped during September ran 0.53%, 0.56%, 0.50%, and 0.43%, for an average slightly above 0.50%. W. R. Noack, president of Apex, reports the recent discovery of a new vein at the mine which is 14 ft in width and which breaks down to more than 1% uranium oxide. Ore is reported to be the best yet produced from the property.

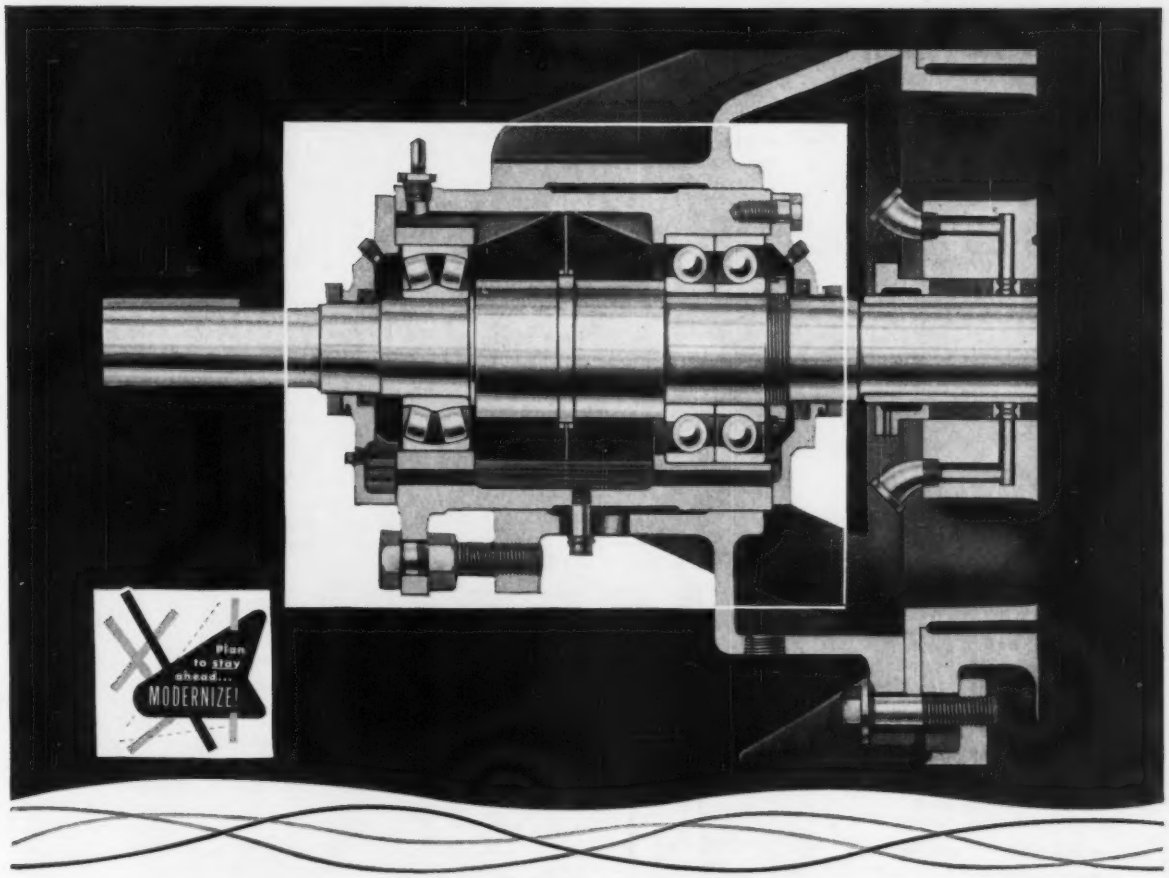
Standard Slag Co. is shipping 150 tons of uranium ore per week from its property near Mountain City in Elko County. Shipments are made to the Vitro Uranium Co. plant at Salt Lake City. Work at the Mountain City site has been in progress since April under direction of E. L. Stephenson.

U. S. Milling and Minerals Corp. is producing 40 tpd gold ore from the Ohio Mine at Goldpoint, Esmeralda County. The shipments to the firm's mill at Silver Peak started in September and included the first production from the mine since 1942. Values run from $35 to $45 per ton. Additional shifts of miners will be employed in the near future, according to company officials, to increase the output from 40 to 100 tpd.

Goldfield-Rand Co. is using a rotary drill on its 1,280 acre claim in Ione Valley and is outlining large deposits of gold-bearing gravel which indicate a value of $1 per yd. Work is being done by the A.S. Mayes Co., of Bakersfield, which started the work with bucket drills and then changed to rotary drills for greater depth. Goldfield-Rand plans to move a large bucket dredge onto the site and process from 5,000 to 10,000 yd daily when the exploration work is completed. Present indications are that the supply will be sufficient for a 10-year operation. Ione Valley lies in northern Nye County.

Leonard Traynor, deputy state mine inspector, is producing a fair grade of gold ore on the 300-ft level of the Tonopah-King shaft north of Tonopah. The property belongs to Calumet & Hecla Mining Co. and is being operated on a lease agreement. Ore is being shipped to the U.S. Milling & Minerals Corp. mill at Silver Peak.

Mervin J. Gallagher, state mine inspector, and the Nevada Industrial Commission during September worked out a cooperative agreement aimed at increasing the safety requirements in certain Nevada mining operations. It is hoped that through the agreement it will be possible to inspect and enforce safety



New bearing bracket

takes reverse thrust

Locked-in bearings mounted back to back in Allis-Chalmers CW solids-handling pumps, permit thrust from either direction. Thrust reversals will not damage bearings.

In addition to locked-in bearings, the new bearing bracket has other advantages — among them:

1. Simple conversion from oil to grease lubrication.
2. *Three* bracket groups to cover all *nine* pump sizes for maximum parts interchangeability.
3. Simplified clearance adjustments between impeller and side plate by means of the cartridge-type frame liner to compensate for wear and consequent loss of efficiency.

This new bracket is standard on all Type CW solids-handling pumps. Contact your A-C office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Nine CW pump sizes for either direct or Texrope drive.

Texrope is an Allis-Chalmers trademark.

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A-C ALLIS-CHALMERS

A-5704

VERSATILE!

1 Mobile Drill now does all 4

- AUGER BORING
- PERCUSSION DRILLING
- SOIL SAMPLING
- CORE DRILLING

the new, powerful

B-52 *pacemaker*

HYDRAULIC ROTARY DRILL with the exclusive **Hollow Stem Auger** . . . *lets you sample while you bore!*

ONLY 4-IN-1 RIG ON THE MARKET . . .

Mobile Drill's new B-52 PACEMAKER brings you unequalled versatility to meet today's demand for greater drilling speed and flexibility. Here's a rugged, powerful, heavy-weight workhorse that mounts on 1 or 1½ ton vehicles and will drive 5' sectional augers to 150' . . . N rods to 600' . . . and A rods to 1000'.

BIG POWER . . . BIG PERFORMANCE!

PACEMAKER's twin hydraulic feed develops 10,000 lbs. hydraulic ram force! Rig has own independent power plant, variable speed control on rotary drive.

COMPACT . . . SELF CONTAINED

Custom mountings are designed to meet your needs, special body fabrications provide storage racks for augers and watertight compartments for tools and accessories . . . everything to make the PACEMAKER a mobile, fast moving, time saving unit.

WRITE FOR BULLETIN TODAY!

For free illustrated folder and complete specifications on the new B-52 PACEMAKER, write

time-saver no. 1

22' TOWER—Permits withdrawal of rods in 20' lengths. Mechanically operated, jackknifes to horizontal position for safe, legal highway travel.

time-saver no. 2

OFF-THE-HOLE HYDRAULIC BASE—Rail-mounted base slides out of way while adding or withdrawing drill sections, assures continuous perfect alignment. Hydraulically operated.

time-saver no. 3

CENTRALIZED 1-MAN CONTROL GROUPING—Located on operator's side of drill base, within easy reach. Fingertip controls plus advanced safety design increases operator's efficiency.

time-saver no. 4

NEW, *EXCLUSIVE* HOLLOW STEM AUGERS—Actually permit all types of sampling while you bore! Augers form their own casing, also allow coring through hollow stem after rock has been reached.

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*** From lightweight, jeep-mounted rigs to heavy-duty all purpose drills—MOBILE DRILL CAN MEET YOUR NEEDS! All drills mounted to your specifications.

Nevada *(Continued)*

measures in mine operations which are worked by the owners without any employees. Such operations are not now under the mine inspector's office.

Metals Exploration Co. which operates a quicksilver mine in Pershing County, has opened a new chemical laboratory and office in Lovelock. R. G. Kirby, chemist, is in charge of the new operation. Samples from all faces as well as tailings of the mine in Dry Gulch are tested, plus samples from other mining properties being developed by Metals Exploration Co.

Iron ore shipments from Pershing County are continuing at a rate of approximately 180 carloads per month. Producers are Dodge Construction Co., Nevada Iron Ore Co., Segerstrom & Heizer, and Minerals Material Co., and shipments are made by Southern Pacific Railway from stations at Colado and Woolsey. Ore is sent to Japan via the port of Stockton, and to the Kaiser Steel plant at Fontana, Calif.

Bristol Silver Mines Co. is carrying out a program of diamond and long hole drilling preceded by geological study at its property near Pioche in Lincoln County, and it is expected that new orebodies will be disclosed. At present the company is employing 40 men producing and shipping oxidized copper-silver ore from an area between the 700 and 1050 levels of the mine. Promising small veins have been encountered, and exploration work is being done on the 1200-level. Shipments of ore are being made to Arizona, since the smelter at Salt Lake City quit handling ores on a custom basis.

Edgemont Mining Co., which had been carrying out exploration work at the Edgemont Mine at White Rock in northern Elko County for the last three years, has ceased all operations.

Standard Slag Co. is producing and shipping 22,000 long tons of iron ore per month from the Minnesota mine near Wabuska in Lyon County. Operations were curtailed last spring but resumed in full scale later in the summer, and shipments are being made to Japan via the port of Stockton. John R. Harmon is superintendent of operations at the Minnesota mine site. At its Gabbs magnesite mine and plant, Standard Slag is producing at 85% capacity due to depressed conditions in the steel industry, which uses large quantities of magnesite as lining for furnaces.

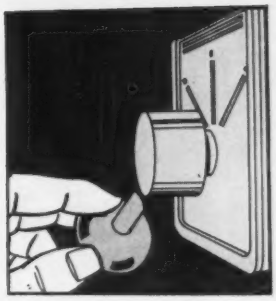
NORTH CAROLINA

Appalachian Exploration Co. of Cranberry, has been incorporated with the North Carolina secretary of state to explore for minerals of all kinds. The firm has authorized capital stock of $100,000. Incorporators are M. T. and Minnie C. Dixon, both of Cranberry, and Dale G. Dixon of Knoxville, Tenn.

(Continued on p 182)

Superior crusher with Hydroset mechanism

Plan to stay ahead... MODERNIZE!



. . . for balanced circuit or constant tonnage

It's no problem to maintain a smooth, high-capacity flow through the plant when you head your circuit with a *Superior* primary crusher. The exclusive *Hydroset* mechanism in the *Superior* crusher maintains the initial setting and a uniform product by compensating for wear on mantle and concave with just the flip of a switch. This means other equipment in the circuit does not require readjustment to meet variations in material size. Result—constant tonnage, higher plant efficiency with lower operating costs.

If a *Superior* primary or secondary crusher stops under load, *Hydroset* mechanism lowers the mainshaft in seconds to help clear the chamber. Changing crusher settings is a flip of the switch operation, too. Only Allis-Chalmers crushers offer the speed and convenience of a hydraulically controlled mainshaft.

Bulletin 07B7870 will give you all the details. Ask your A-C representative for a copy, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS A-5605

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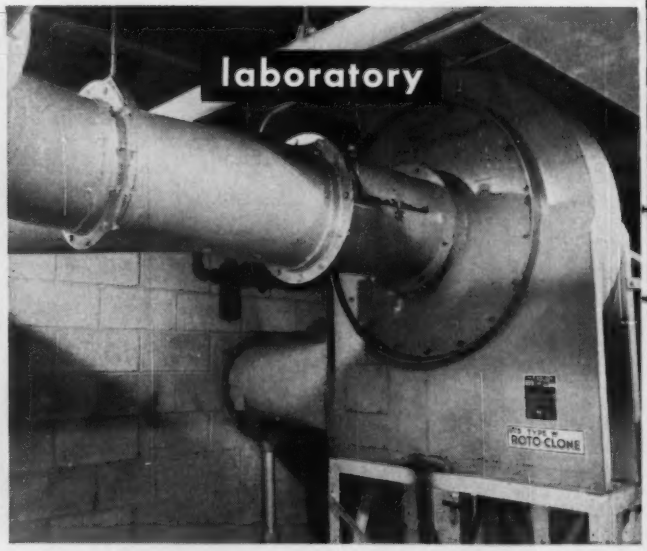
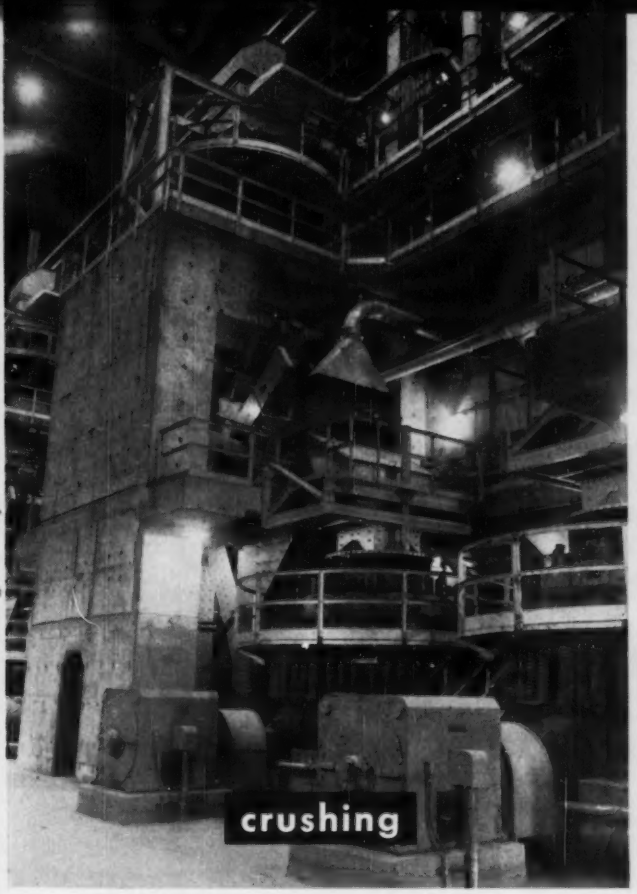
Superior and Hydroset are Allis-Chalmers trademarks.

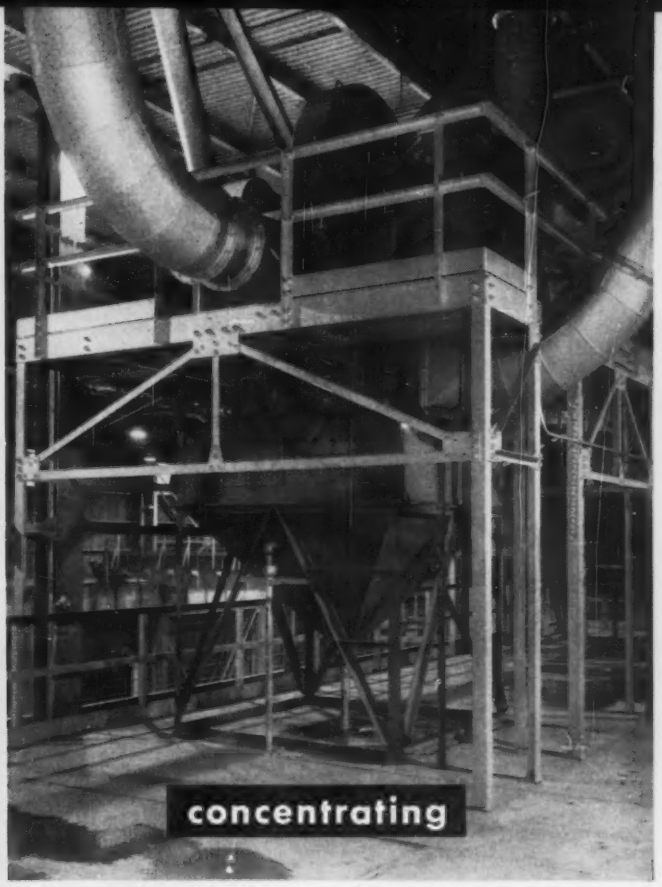
AAF dust control "rides herd"

AAF Type N ROTO-CLONE exhausting bottom discharge of pelletizing furnace. It's one of 35 Type N's at this installation exhausting pelletizing furnaces, coal dryer and transfer points.



Type W ROTO-CLONE exhausting dust-producing operations in laboratory. It's one of 30 Type W units at this plant. Others exhaust crushing, screening, transfer and bin ventilation operations.





on tough taconite ore!

All operations dust-proofed by 65 AAF ROTO-CLONES (1,100,000 cfm!)

Dust never shows its face in this modern taconite processing plant. From the first transfer point, through crushing, concentrating and pelletizing, it's under the complete control of two types of rugged AAF ROTO-CLONES—the Type W and Type N.

These collectors have been dust-proofing taconite since 1947, and are now used by *all* major processors. The Type W combines the principle of dynamic precipitation with dust-trapping water sprays. The Type N combines centrifugal force with the thorough intermixing of water and dust-laden air. *Both* offer (1) small space requirements, (2) maintained performance, (3) constant exhaust volume, and (4) high collection efficiency.

For more information on these wet-collecting ROTO-CLONES, call your nearest AAF representative or write for Type W Bulletin 274 and Type N Bulletin 277. Address: Mr. Robert Moore, American Air Filter Company, Inc., 193 Central Ave., Louisville, Kentucky.

AAF **American Air Filter**
COMPANY, INC., LOUISVILLE, KENTUCKY

AN ALUMINUM BODY shone brilliantly at the Oshkosh Motor booth. Model is a 30-ton end dump, with 4-wheel drive.

KW-DART attracted attention with its 64-ton, 8-speed model 804-B. Power is from a 600-hp Cummins engine.

MACK TRUCKS' 34-ton LRVSW follows through on the "big" trend in haulage. Cummins engine is 400-hp, 4-wheel drive.

LeTOURNEAU- WESTINGHOUSE showed its new "Haulpak," 32- 27- and 22-ton sizes. You can write for Form Th115.

AMC Show

(*Continued from p 138*)

the stabilization bill in its ill-fated trip through Congress, and asked the mining industry to reserve its decision on the quota plan.

"We will not throw bouquets," he said, "but we will not throw rocks either." The industry has yet to see the new "vehicle" operate, he noted, "but it does seem to have four wheels and a motor. We'll wait and see."

Sentiment among mining men at the meeting ranged from great disappointment with what was called the plan's "inadequacy," to an attitude paralleling that of the lead-zinc committee chairman.

Rep. Ed Edmondson, (D-Okla.) was one of the former. In the first speech of the session devoted to minerals policy, he said, "I don't think it will open a single closed mine in this country." He criticized the Administration effort, noting that "the mountain has labored mightily and brought forth a mouse." Several lead and zinc operators seemed of the same opinion.

Supporters of the Administration's plan, who addressed the minerals policy session, called industry attention to two obstacles to the full tariff protection which had been requested. Thomas C. Mann, assistant secretary for economic affairs of the Department of State, pointed out that "the supply-demand imbalance is not just a U. S. problem, it is a world problem.

The life of the quota plan was only one of the questions bothering mining men and reporters at the convention. At the Seaton press conference, held after his speech on the opening day, the Secretary made the following observations:

1) That the quota plan could be expected to bring lead and zinc prices "into the range" that they would have enjoyed under the Seaton plan. (Industry spokesmen disagreed with that belief.)

2) That the quota plan had not been discussed at the London minerals meeting.

3) That the U. S. can still negotiate with other nations on metal agreements.

4) That the Administration is still "actively considering" aid for copper and other depressed minerals. (But the implication here was that there was little hope for any tangible aid or protection.)

One of the more interesting attitudes presented by some of the speakers on the subject of a U.S. mineral policy was summed up by Rep. William Dawson (R-Utah). "In this panel discussion of a minerals policy," he said, "we are handicapped by the fact that we do not have a minerals policy to discuss."

V. C. Wansbrough, vice president and managing director of the Canadian Metal Mining Association, Toronto, told the

J. HALL CARPENTER of Carpco Inc. won the Salmon Derby with a 39-pounder.

Here's why WEST END can answer your inquiry on product availability immediately!

When you phone an order or request information on current availability or long term supply of a product, the Sales Office Manager in Oakland with whom you speak can contact the plant at WEST END immediately. He talks by private wire teletype with the Production Manager. An answer or firm commitment is given immediately. It is relayed to you often while you are still on the phone.

WEST END's Sales Office Manager sales representatives and plant executives work together as a team manning a system that is, in our opinion, uniquely outstanding in the chemical industry. Their confidence in the efficiency of this system is reflected in the enthusiastic, helpful and friendly manner in which they promptly serve you . . . our customers.

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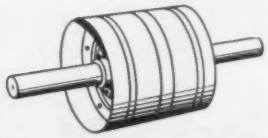
SODA ASH
SODIUM SULFATE
BORAX • HYDRATED LIME

STEARNS
Indox V Magnetic Separators

THE LOWEST COST, MOST EFFICIENT TRAMP IRON STOPPERS ON THE MARKET TODAY!

First to take advantage of the remarkable magnetic properties and money-saving features of Indox V is Stearns—the leader in design and development of magnetic equipment for more than 40 years. *Only Stearns uses Indox V* in magnetic tramp-iron separation equipment. Here are four brand new Stearns separators that are introducing a new era of tramp-iron protection for all industry.

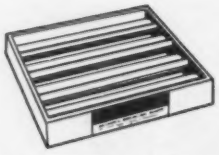


NEW INDOX V MAGNETIC PULLEY

Installed at head of belt conveyor system, outperforms conventional permanent magnet pulleys, equals deep-field power of electromagnetic types. Radial design boosts holding efficiency for maximum separation. Standard widths and diameters to match your present system. Ask for Bulletin No. 1021-D.

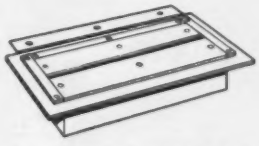
NEW INDOX V MAGNETIC DRUM

An ideal unit for process industries where granular materials are conveyed in enclosed chutes or spouts. Revolving stainless steel cylinder inside a welded steel housing carries material over stationary magnet assembly, which holds iron particles beyond discharge of non-magnetic product. Indox V produces exceptionally uniform field *30 to 40 percent stronger* than old-style permanent magnet drums. Complete range of types and sizes for any installation. Write for Bulletin No. 1051-D.



NEW INDOX GRATE MAGNET

Easily installed in any hopper or floor opening, chute or duct, guards your product and plant against dangerous tramp iron. Collecting tubes, with continuous magnetic poles along their entire length, leave no "dead" spots. Effective area is actually 400 percent greater than in ordinary grate magnets! Complete range of types and sizes for any installation. Bulletin No. 1072-D.



NEW INDOX V PLATE MAGNET

Provides separating efficiency far superior to ordinary plate magnets. Powerful, uniform magnetic field traps iron particles in flowing material in chutes, ducts, spouts or on conveyors. Excellent tramp-iron protection at low cost. Write for Bulletin No. 1073-D.

WHAT IS INDOX V?

Indox V is a highly oriented barium ferrite *ceramic* material. Its energy is comparable, on an equivalent weight basis, to that of Alnico V — the most powerful permanent magnet material available. Indox V magnets possess unique advantages — light weight, high electrical resistivity, great resistance to demagnetization, inexpensive, non-critical raw materials—plus an energy product over three times that of non-oriented ceramic magnets. Indox V is used in separators manufactured by Stearns exclusively.

STEARNS MAGNETIC PRODUCTS

A DIVISION OF THE INDIANA STEEL PRODUCTS COMPANY

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AMC *(Continued)*

AMC members that Canada would feel the impact of the quota plan, and would be studying it, "and the 1.7c change in copper" very carefully. He reminded his audience of Canada's role as a consumer of U.S. goods and a supplier of U.S. needs, and expressed a hope for an amicable solution to the nations mutual trade problems.

Mr. Schwab, in defining his lack of immediate enthusiasm for the quota plan, offered the following statistics, which he said showed little hope for a revitalized lead-zinc industry.

	Tons Pb	Tons Zn
Imports permitted by the quota plan	355,000	521,000
Present rate of U.S. mine production	275,000	400,000
Scrap recovery	400,000	60,000
Tons available for U.S. consumers	1,030,000	981,000
Present rate of U.S. consumption	925,000	900,000

In other words, the speaker said, unless demand in the U.S. picked up, the domestic producers' share would not feel the benefit of the quota plan since what is left of the difference between tons available for U.S. consumers and the present U.S. consumption would "still overhang the market." And, he noted, there is a large stockpile in smelters' hands which must be worked off before demand can improve.

The only word to describe the equipment exhibited, and the show itself, is "big." As the pictures on pages 138 and 170 indicate, equipment size is reacting inversely to the quality of rock being handled. Larger and larger payloads seem to be required for the larger volumes of rock and overburden encountered in modern mining. Leading the parade in eye-stoppers was the R. G. LeTourneau plus-100-ton bowl scraper, designed to take up to 100 yd of earth. Haulage men were most excited by its power plant. Each wheel is powered by its own electric motor, the juice being supplied by a diesel electric generator under the hood. Thus, only electricity is transmitted to the wheels, and not motive power.

Another innovation was the Koehring "Skooper", a sort of shovel loader which can bite, crowd and load without moving on its track. The shovel has a 6 ft 11-in. crowd length and can work in an 18-ft maximum. Clearance height at beginning of dump is 11 ft 9 in. (See photo.)

A tour of the exhibition floors with notebook and camera elicited the highlights shown in the accompanying pictures.

The following is a summary of a few of the very important papers offered to members of AMC at the San Francisco meeting:

Individual papers will be published in the AMC *Journal* in the future, but the following excerpts include some of the highlights of the individual sessions.

The Big Haul. Overburden disappears fast when this big dragline excavator swings into action. Here the 22-yd bucket has just taken a large mouthful as it thins down the layer of earth above the coal seam.

For this surface job in Pennsylvania's anthracite country, the stripping contractor used Bethlehem Type U dragline ropes. Type U has husky outer wires and is highly resistant to abrasion, especially when furnished lang lay. Even when dragged for long periods over hard earth and abrasive rocks, it's a mighty tough rope to wear out.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

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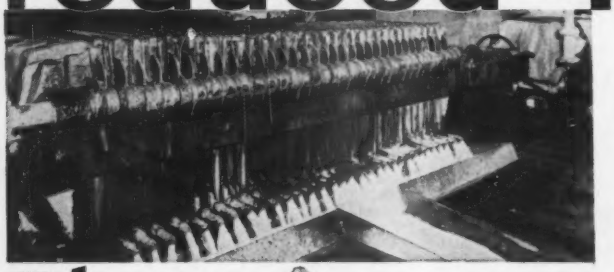
annual filter paper costs reduced 41%



at ANACONDA® with NETONE FILTER PAPER

- *Netone has service life of 12 cycles (old paper lasted one cycle)*
- *Easier to put on filter press, less installation damage*
- *Shows excellent resistance to solution shock*

At The Anaconda Company, Electrolytic Zinc Plant, located at Anaconda, Montana, Netone filter paper has been used exclusively on the Shriver filter presses since January 1, 1955. Netone is a heavy, neoprene filled paper possessing remarkable wet strength characteristics.

Prior to the use of the Netone paper on the Shriver presses, it was necessary to discard the kraft paper sheets then in use each time a press was cleaned. The life of the Netone paper in the same service is an average of 12 press cycles. Due to its greater wet strength, the Netone paper is less apt to be damaged during installation and has greater resistance to rupture from solution shock when the press is put in service.

Annual filter paper costs have been reduced 41%. The savings in labor and filter down time are also considerable.

Why not try NETONE Filter Paper on your filter? Test samples on request, no obligation, of course.

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Toronto: Lee Benner Chem., C. P. R. Roadway, 1119 Yonge Street
Mexico City: Maquinaria Minera, Apartado Postal #215
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Montreal: Lee Benner Chem., 4700 Prince of Wales

AMC *(Continued)*

New techniques in exploration drilling were cited by V. N. Burnhart, vice president of E. J. Longyear Co. who documented the contribution of drill hole circulating pumps in cleaning the hole, cooling the bit, effecting savings in diamond bit costs, reducing "stuck" drill strings, improving core recovery and cutting rock grinding. He also noted that drill hole stabilization has been accomplished in ground previously considered impossible, with the use of drilling mud and flocculants.

Mr. Burnhart described the adoption of "W" series drill rods, and said that cleaner holes, lower vibration of rods and improved cooling were the result of its use in many cases. He also mentioned the successes being achieved with the "processed" diamond in this country and in Canada, and with careful diamond bit design for the specific ground being drilled. Use of shot hole drills for handling the unimportant (geologically) overburden, followed by diamond drills for the ore horizon work was also described as "beneficial."

In a discussion of wire line tools and techniques, Mr. Burnhart noted the existence of a "new substance known as 'AM-9'", now being field tested, which he said has interesting possibilities as a drill hole stabilization agent. "In porous or fractured, unconsolidated material, it can be injected ahead of the bit and rapidly sets, consolidating the material so that it can be cored.

"Under development and being tested is an intriguing core barrel known as 'The Rubber-Sleeved' core barrel. Tests made by the petroleum industry have produced some very encouraging results in coring loose sand and gravel.

"Percussive down hole drilling tools applicable to small diameter holes are being developed. Likewise, considerable effort is being expended to perfect the small diameter, turbine type, rotary down hole drilling tool. The prospect of successful application of down hole drilling tools, because of certain favorable economic aspects, (holds the promise of) increased drilling progress."

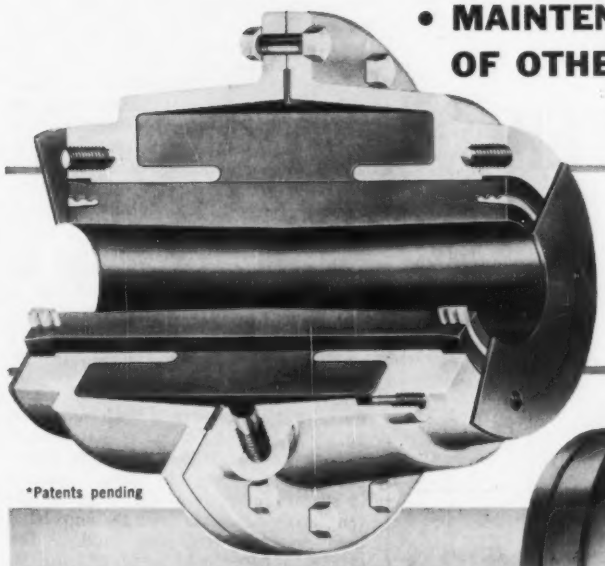
Underground blasting with prilled AN was the subject of Joseph B. Elizondo, general superintendent of mines, Tri-State Mines, Eagle-Picher, who noted that, while there were many valid objections to AN use underground, tests at his property indicated that it is entirely applicable "under certain conditions."

The conditions mentioned, all of which applied at Tri-State, included: essentially dry working areas; easy ventilation; 16-hour interval between shifts. The majority of holes average 2½-in. in diameter and 10 ft deep.

Pre-waxed paper shells (1¾ x 16-in.) were filled with AN (one gallon of No. 2 fuel oil per 100 lb AN). Loading and shooting was on trial-and-error basis, but best method evolved included placement of a booster cartridge between every pair of AN cartridges; use of uncoated prills for increased sensitivity; slitting the cartridges before tamping; use

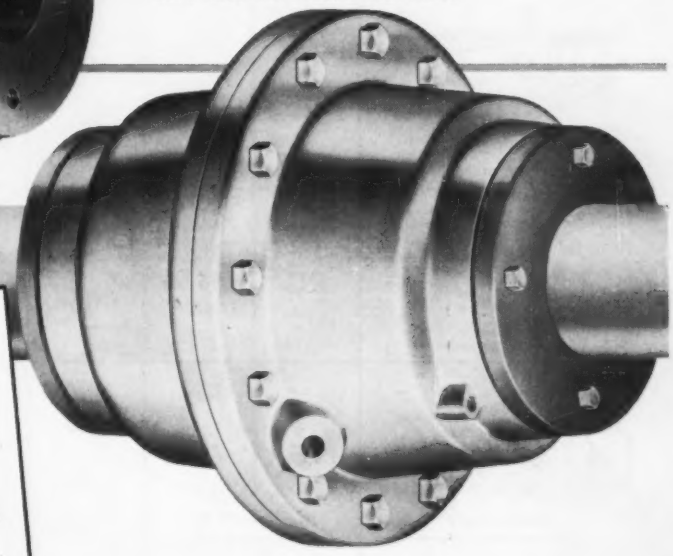
CLARKSON SLURRY VALVE

- **FLOW CONTROLLED–AS IT SHOULD BE —THROUGH A VENTURI RESTRICTION**
- **MAINTENANCE COST AS LOW AS 10% OF OTHER RUBBER VALVES**



*Patents pending

Clarkson Valve, Model C . . . an advanced design for control, with plant air, of abrasive and corrosive slurries.



- ✓ Jacketed steel construction — Two piece housing.
- ✓ Constrictor "muscle" of rubber creates the centered orifice.
- ✓ Full length 1" thick liner of pure gum or Neoprene at low cost.
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The Clarkson Company has long been identified in the field of controls. Clarkson Valves maintain the same high standards of quality and performance at low prices that have made the Clarkson Feeders in Stainless Steel and Inert Plastics known to all mining operations and other industries.

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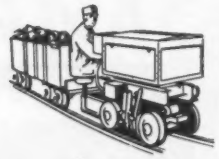
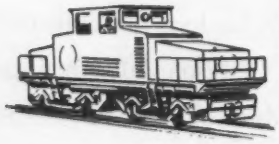
NEW EXIDE-IRONCLAD LOCOMOTIVE BATTERIES PACK UP TO 45% MORE POWER

APPLICATION	NEW TYPE BATTERY	CAPACITY PER POS. PLATE	REPLACES BATTERY TYPE	PERCENT CAPACITY INCREASE
 Trammers	MG	45 ah	MVM ML	32.4 17.5
Mine locomotives	RG	55 ah	ML TLM	43.6 5.0
Shuttle cars	TG	72 ah	TLM TH	44.0 20.0
 Battery locomotives	TEG	95 ah	(new type—no prior data)	
	MEG	145 ah	MEH MEX	45.0 21.0

Boost the work capacity of your locomotives

These new, advanced Exide-Ironclad Batteries pack more power in the same space. They equip your present locomotives to do more work. And they actually cost less per ampere-hour, promise even longer life of service. Get complete information. Call your nearby Exide representative. Or write Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

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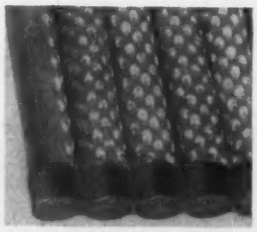


THE SECRET. New tubular construction packs more power in each positive plate . . . prolongs battery life.

AMC *(Continued)*

of Primacord with a PETN core, placed to be in contact with each booster.

In "The Science of Mine Ventilation", John H. Warren, of Anaconda, observed that ventilation costs today are a major item on the cost sheet, and have become an important part of mine management's problems. In a discussion of cooling and ventilation methods, Mr. Warren noted that "Even though the mines of the Anaconda Co. have deepened considerably in the last 20 years, it has been possible to more than double the displacement with only a 70% increase in horsepower. Anaconda is at present experimenting with plastic overlay plywood for smoothlining of airways."

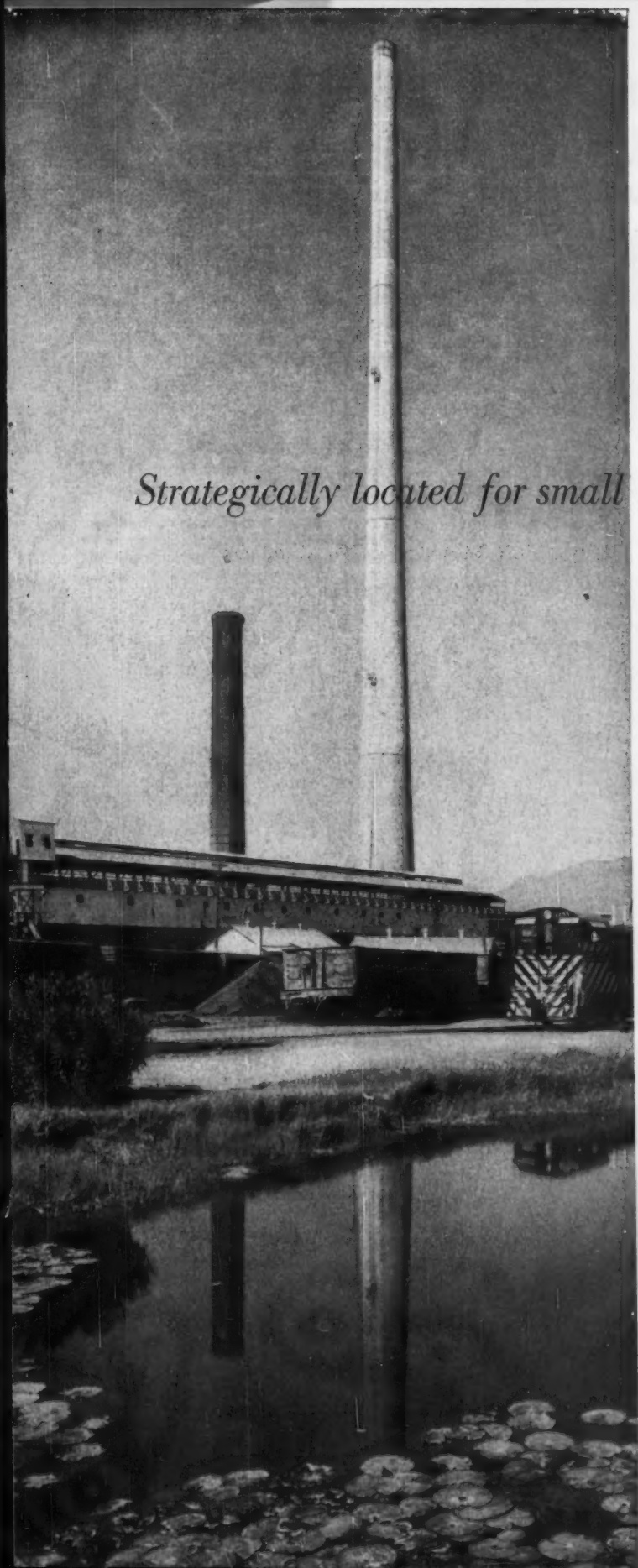
Podbielniak centrifugal extractor has reduced the inventory required for a solvent extraction uranium mill according to Neill K. Banks in his paper "Texas-Zinc Minerals Project"—Texas-Zinc needs only 3,000 gal of solvent in the entire circuit, whereas a mill using static equipment would require about 60,000 gal for the same 800 tpd capacity. One extractor is used to take uranium from the pregnant liquor; another to strip uranium from the pregnant solvent. Early difficulties with the units have been overcome. See, New Products Digest, *E&MJ* December 1957, p35 for details on the contractor-extractor.

Gordon W. Barr, Southwestern Portland Cement Co., Los Angeles, Calif., in his "High Temperature Gas Cleaning in Cement Plants Using Fabric Filters" says that Southwestern is successfully using glass bags in their baghouse at 550 deg F. Gas volume is 95,000 cfm into 576 bags having 43,000 sq ft cloth. Bags are self-cleaning when draft is shut-off intermittently.

William L. Lennemann and Frank E. McGinley stressed "Advances in Uranium Ore Processing"—cheap leaching of low-grade ore at Urgerica, Portugal where small amount of pyrite and ferrous sulphate are added to the dump, and pregnant liquor produced by rainfall is collected and sent to the mill circuit; National Lead Co. has developed Cu-NH_3 oxidation technique for carbonate leaching and maintaining the uranium in the hexavalent state. Copper concentration is around 0.5 gm/l and that of the ammonia is 3 gm/l. Leaching, recovery and cost savings have been substantially improved.

He also discussed the changeover to alkaline resin-in-pulp at Monticello starting in August 1958; trend toward sodium nitrate elution in ion exchange instead of ammonium nitrate; the adaption of the Eluex Process at Edgemont. Eluex elutes uranium from resin with 8- to 10% sulphuric acid, then strips with solvent extraction with sodium carbonate. Advantage is that mill effluents and pond water contain no added nitrate or chloride and can be returned to the process.

National Lead has developed a method of producing UF_4 (metal grade) at the



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COPPER SMELTERS
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Garfield, Utah
Tacoma, Washington
San Luis Potosi, S.L.P., Mexico

LEAD REFINERIES
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Omaha, Nebraska
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Tacoma, Washington

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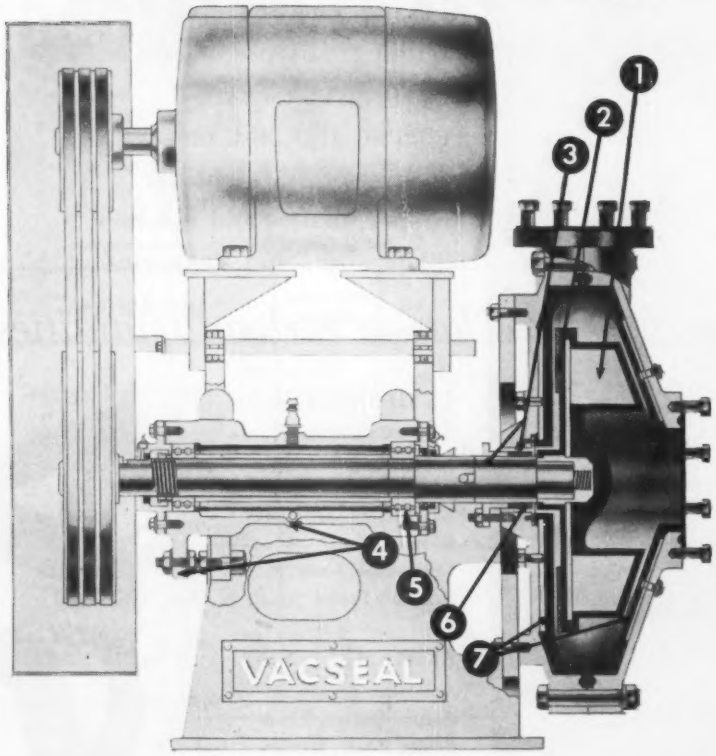
58-54

ASARCO

7 reasons why VACSEAL PUMPS are built to serve you better



1. Three blade semi-open rubber covered impeller prevents clogging — gives maximum service.
2. Sealing blades on reverse side of impeller are of greater diameter—keep packing under suction. No sealing water required.
3. Gland bushing of alloy or plastic and shaft sleeve to suit service.
4. Adjustable bearing assembly compensates for impeller wear.
5. Heavy duty bearings.
6. Packing gland is provided to prevent pump leakage while pump is not operating.
7. Heavy duty replaceable rubber liners vulcanized to metal reinforcing plates.

Vacseal Pumps, built to handle all types of abrasive and corrosive pulps, embody the patented design which prevents solids from entering the gland. The impeller of the pump is a disc with pumping vanes on one side and auxiliary vanes of a greater diameter on the reverse side. These vanes produce partial vacuum at the shaft seal and prevent solids from cutting the shaft or packing. This results in a virtually glandless pump that requires no sealing water. Solids and acid-handling Vacseal Pumps in sizes 1½" through 8". Capacity ranges from 10 through 3600 gpm, heads up to 150 feet, suction lifts up to 12 feet.

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AMC *(Continued)*

mill. Uranium is stripped from the leach liquor with kerosene and amines, then cupric sulphate, HF and SO_2 are added, throwing down the uranium as $UF_4 \cdot \frac{3}{4}H_2O$ which must be dehydrated.

Mary Kathleen will leach at 1.9 pH to keep phosphate out of the circuit. Port Pirie uses pH control and shock cooling of leach liquor with plenty of water to throw down titanium. Several Blind River mills filter leach pulp to reclaim acid for reuse. Beaverlodge has gotten hold of their corrosion problem by holding pH above 9.5 in the carbonate autoclaves.

News *(Continued from p 170)*

TENNESSEE

TVA will push high-analysis fertilizers and economic by-product recovery processes. These are the big objectives in this fiscal year's phosphate operations of the Tennessee Valley Authority's Fertilizer-Munition Development Center, Muscle Shoals, Ala.

The Authority hopes to develop a process for economic recovery of fluorine compounds—in a form suitable for use in primary aluminum and other industries—from domestic phosphate rock. TVA figures that this could become a new commercial source suppling up to about 40% of U. S. industrial requirements for fluorine and its compounds.

The TVA also hopes for major operating economies in fertilizer operations through development of processes for recovering other waste products, such as elemental phosphorus from sludges and liquors in electric furnaces, and hydrogen and nitrogen from waste gases in ammonium nitrate units.

UTAH

A discovery of a high grade silver deposit near Enterprise was reported by a joint venture in which Chief Consolidated Mining Co., Eureka, is a member.

Other members are Salt Lake mining engineer Samuel Arentz and metallurgist Robert R. Porter, an associate of Mr. Arentz.

In drilling a number of core holes from the surface, the Chief brought up samples running between 16 and 50 oz of silver per ton. The ore is reportedly low in lead and zinc.

The discovery is now being studied with an eye toward mining and possibly erecting a cyanide processing plant.

P. B. Tandy, secretary and treasurer of New Venture Mining & Milling Corp., reports progress being made on their Twin Sisters group, consisting of nine claims in the Eureka Mining district, southwest of Silverton.

The corporation, headed by L. C. Farrell Jr., has as other officers; R. L.

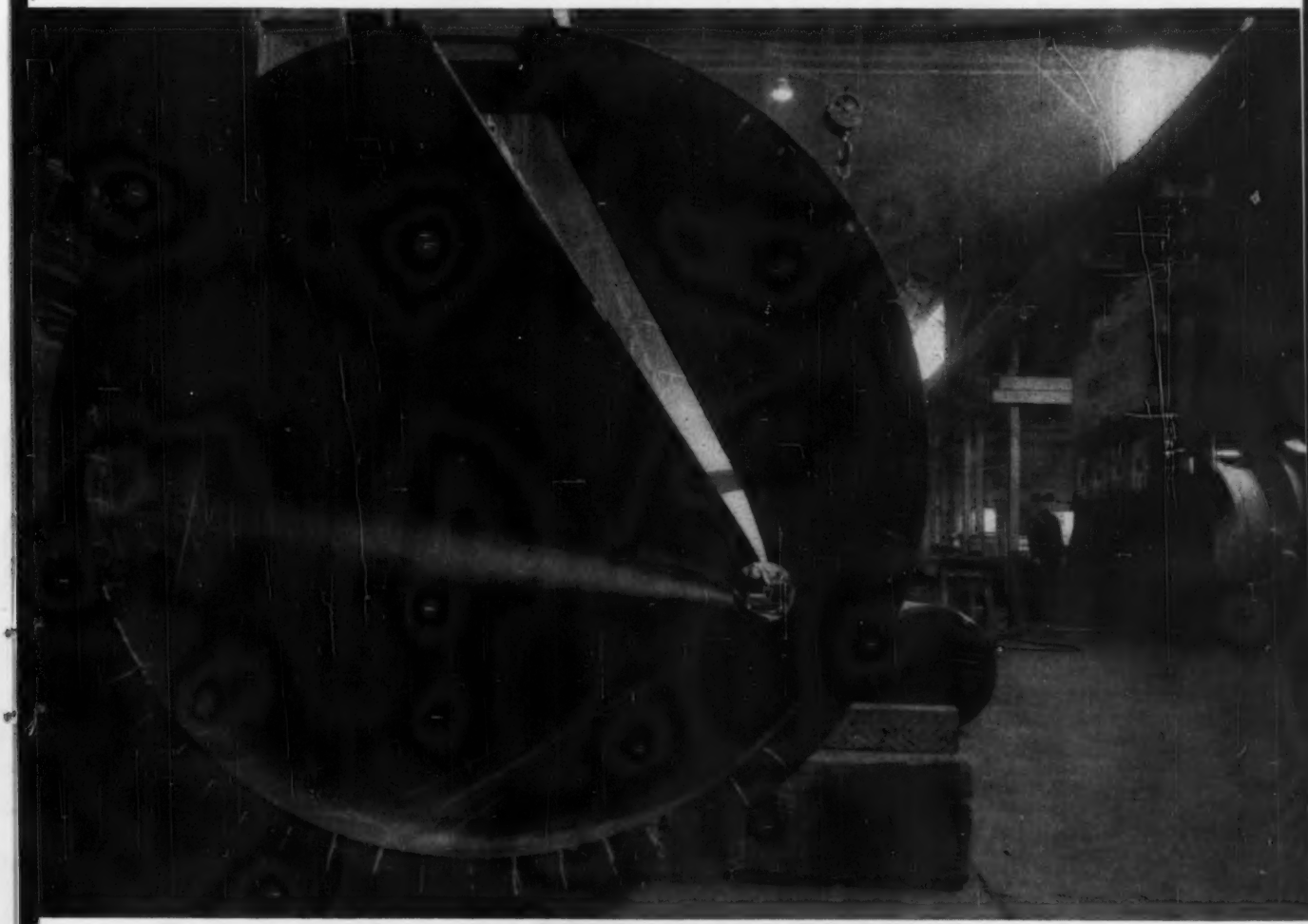
Tubular High-Strength Steel dipper stick is stronger and lighter

The picture shows a plate of High-Strength Steel that has been formed into one of the stiffest, strongest structural shapes known to man: a tube. It will become an amazingly light and tough dipper stick and permit a shovel to operate with greater cycle speed and capacity. In addition, the design and the steel combine to give it tremendous resistance to bending and shock loading, even at very low temperatures.

Both USS* TRI-TEN High-Strength Low-Alloy Steel and USS T-1*, a Constructional Alloy Steel, have been used in the most highly stressed members of many shovels—in booms, crowd members, buckets, bail assemblies and frames. They respectively offer increased yield strengths of about 1½ and 3 times that of structural carbon steel, along with good welding qualities and excellent toughness. Both steels are helping the present-day operator achieve one of his most important goals: to move more and more material at less cost.

When you invest in mining machinery that must do heavy work, specify USS TRI-TEN* or USS "T-1" Steel for faster, longer, more trouble-free operation. Your builder can give you details.

USS Tri-Ten Steel dipper handle during fabrication at National Annealing Box Co., Washington, Pa., for Bucyrus-Erie. Sizes of high-strength and alloy steel dipper sticks made here have ranged up to 40" x 77' with 1.75" wall thickness.



United States Steel Corporation – Pittsburgh
American Steel & Wire – Cleveland
Columbia-Geneva Steel – San Francisco
Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Supply – Steel Service Centers
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USS *TRADEMARK

United States Steel

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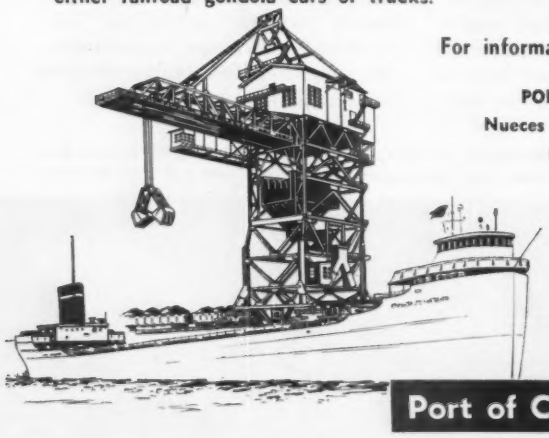
Modern BULK MATERIALS HANDLING DOCK

• This great new facility will unload bulk materials, including ores, from ship at the rate of 1000 tons per hour. It will save time and money.

• The new dock will be served by three railroads: Missouri Pacific Lines, Southern Pacific Lines, and the Texas Mexican Railway.

• A 10-ton bucket will unload ores and similar cargo into a 100-ton hopper on the tower. Material from the hopper can be loaded into either railroad gondola cars or trucks.



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There's a reason! They're lightweight, yet designed and built to stand-up under the most rugged conditions. Your choice of power plant and mounting on trailer or small truck.

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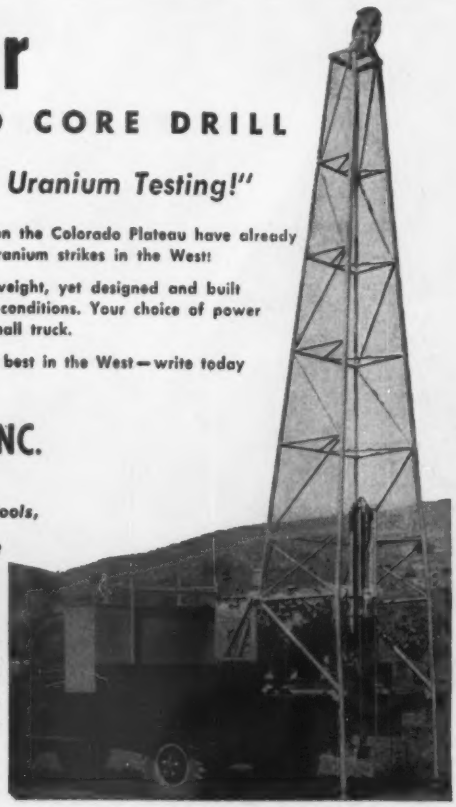

Here's one of the portable, self-contained Acker Teredo Drills already in use on the rough, remote terrain of the Colorado Plateau. A built-in water supply tank permits this rig to operate anywhere!

Utah *(Continued)*

Farrell, vice president, S. L. Blight, and D. H. Jardine. The home office is in Boulder.

Lucky Mc Uranium Corp. reports a net profit of $691,977, all earned in last quarter of its fiscal year ended June 30, 1958.

President Allen D. Christensen said the figures are before taxes and depletion. Depreciation and depletion totaled $351,692.

Mr. Christensen, who also heads Utah Construction Co., controlling more than 60% of Lucky Mc stock, said 398,000 lb of uranium oxide were delivered to the AEC during the fiscal term.

He also announced that as a result of amendment of contracts between Utah Development Co. and Utah Mining Corp., both subsidiaries of Utah Construction Co., Lucky Mc would experience a "substantial improvement" in profits.

Rico Argentine Mining Co. reported net profit of $8,989 for fiscal term ended June 30, 1958 versus loss of $197,804 for the previous year. For the first time in 20 years, the firm produced no ore from its Rico, Colo. properties—earnings were solely from conversion of pyrites to sulphuric acid which was sold to local uranium mills.

Standard Uranium Corp. has developed an additional $5½-million in gross ore through drifting in the south end of its Big Buck claims in San Juan County's Big Indian District, according to Standard president W. R. McCormick.

The newly-developed "high grade" will produce 1½-million lb of uranium oxide when shipped to Uranium Reduction Co. mill at Moab, he said.

Mr. McCormick stated that the ore was in addition to the deposit found on the southwest boundary of Standard properties adjoining the Col-U-Mex Uranium Co.'s recent ore development. Standard is a 50-50 (net) operator on the Col-U-Mex venture 1,500 ft from the Big Buck mine, he said.

Standard is now shipping at the rate of 9,500 tons of ore monthly from the Big Buck and the Col-U-Mex ground. No shipments are coming from the Standard ore area near the discovery on Col-U-Mex ground.

WASHINGTON

Flaghill Mines, Inc., of Oroville, has reopened the old Spokane mine at Wanacut Lake, southwest of Oroville. A four-man crew is working at the site, which in previous years has produced gold, silver, lead and copper ores. Last production was in 1938.

Work is now about 30% complete on a new inclined shaft sinking operation at the Grandview mine in the Metaline district, officials of American Lead, Zinc & Smelting Co. said.

J. W. Currie, resident manager of the mine, said the new shaft will gain about 150 ft of depth vertically. It is 3,000

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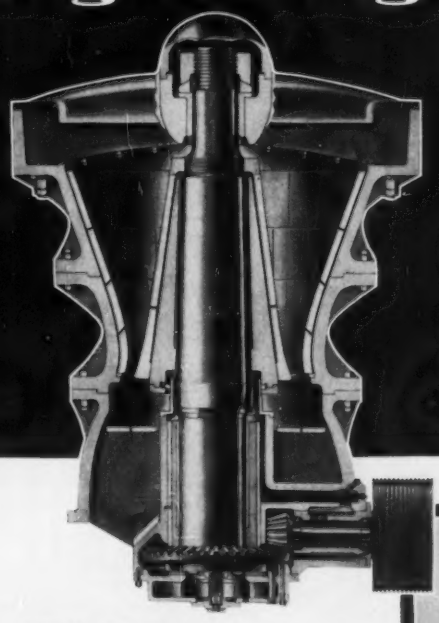

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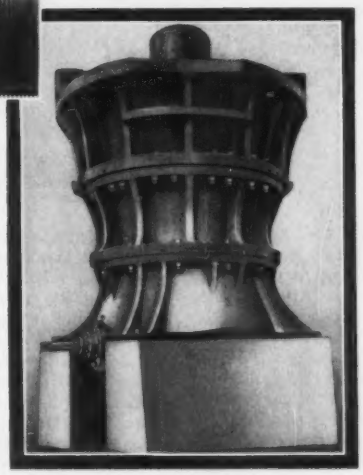

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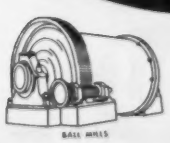
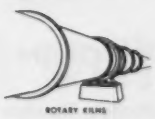


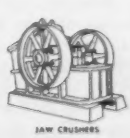
BALL MILLS



ROTARY KILNS

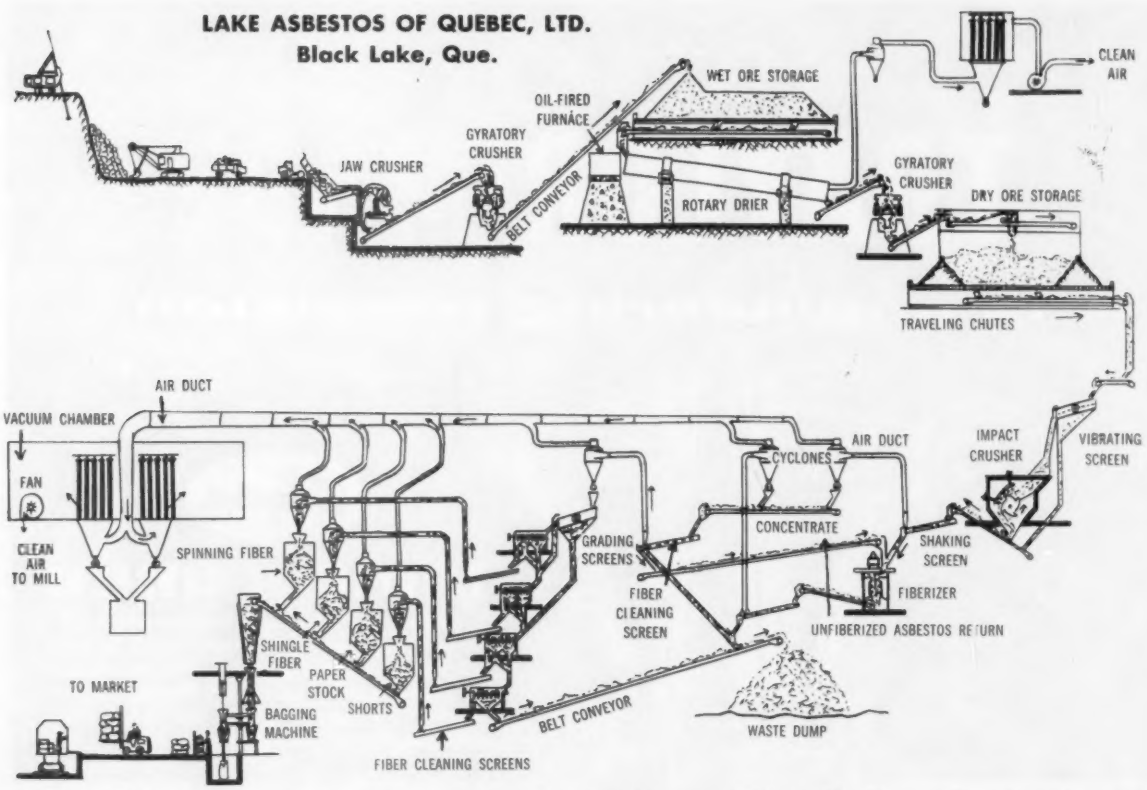
APRON FEEDERS

PRIMARY GYRATORY CRUSHERS



JAW CRUSHERS

SECONDARY GYRATORY CRUSHERS



800,000 CFM OF AIR is used in the 9.2-million mill to lift fibers from the vibrating screens to the cyclones. Various crushing stages liberate fiber from rock, with subsequent grading into the various commercial types of product.

Black Lake Asbestos

(*Continued from p 19*)

is exhausted in warm weather, recirculated in cold weather.

Approximately 800,000 cfm air is consumed in the mill, 180,000 cfm in the drier building.

In his AMC paper, Mr. Mann notes that a blanket of organic ooze, silt, sand and gravel from 100 to 130 ft thick covered the lake bottom. "After consultation and studies with engineers of Construction Aggregates Corp., the company doing the Steep Rock dredging, and others, it was decided that dredging would be feasible, and, in fact, would be the only practical method of removing the soft materials at anything but a prohibitive cost, and within a reasonable period of time."

The following quotes are from Mr. Mann's paper:

"The dredge and auxiliary barges, pontoon line, shore pipeline, booster pump stations and so forth, were constructed by Construction Aggregates Corp. and commenced operating in July 1955. The 32-in. dredge pump, powered by a 6,000-hp motor, handles materials varying from 17- to 20% solids at a rate of 35,000 to 45,000 gpm. Boulders up to 18-in. in diameter can be handled by the pump. The rotating cutter head at the end of the digging ladder is driven by an 800-hp motor, and in operation cuts a swath 250 ft wide by 40 ft in depth. Discharge lines are 32-in. O.D. x ¾-in. plate for the pontoon line and 32x½ for the shoreline pipe. (Latter is more accessible for repairs.—Ed.) When pumping to the most distant disposal areas, two booster pumps are required, of the same design as the dredge pump, one powered by a 6,000-hp motor and the second by a 2,500-hp motor. (Water, after settling, is returned from disposal areas to act as a vehicle for more silt from the lake.—Ed.)

"Dredging operations have continued winter and summer since commencement and as of July 1, 1958, a total of 26.6-million cubic yd of solids have been removed and stored in disposal areas. The best single month's operation was 1,454,135 cubic yd of solids removed. Dredging is expected to continue until about mid-year 1959 when the total to be removed as now scheduled, should reach approximately 31-million cubic yd.

"Another useful method of applying the dredge's power for moving earth, designed by CAC's engineers, is the insertion of a 12-in. dia monitor nozzle in the pump discharge line, to obtain the sluicing power of 45,000 gpm of water in a concentrated stream. Nozzle pressure is approximately 150 psi and the stream has an effective distance of 400 to 500 ft. As much as 200,000 cubic yd of material have been washed down in 24 hours from banks above the lake level by the monitor. . . . It has been possible to lower the lake level more rapidly and thus expose areas required for mechanical stripping to proceed concurrently with dredging. The monitor has also been used very effectively for 'blasting out' pockets of boulder clay immediately over bedrock, that otherwise would have had to be cleaned by tortuously slow methods, including hand shoveling."

Another CAC innovation, designed to prevent blockage of the pump by large boulders, was the placing of a totally submerged 20x36-in. jaw crusher in the suction line.

Despite the proximity of other producing orebodies, the Black Lake deposit was virtually disregarded until 1948, when Philip Malouf of Montreal formed United Asbestos Corp. and, in 1952, brought the results of his exploratory work to Asarco. In May 1954, following more drilling and testing, Asarco exercised its option with United and Lake Asbestos of Quebec began to work the orebody.

Washington (*Continued*)

ft from the bottom of the present shaft operations. The new shaft will be used to reach deeper ores at the Grandview mine.

WYOMING

Western Uranium Corp. completed strip-

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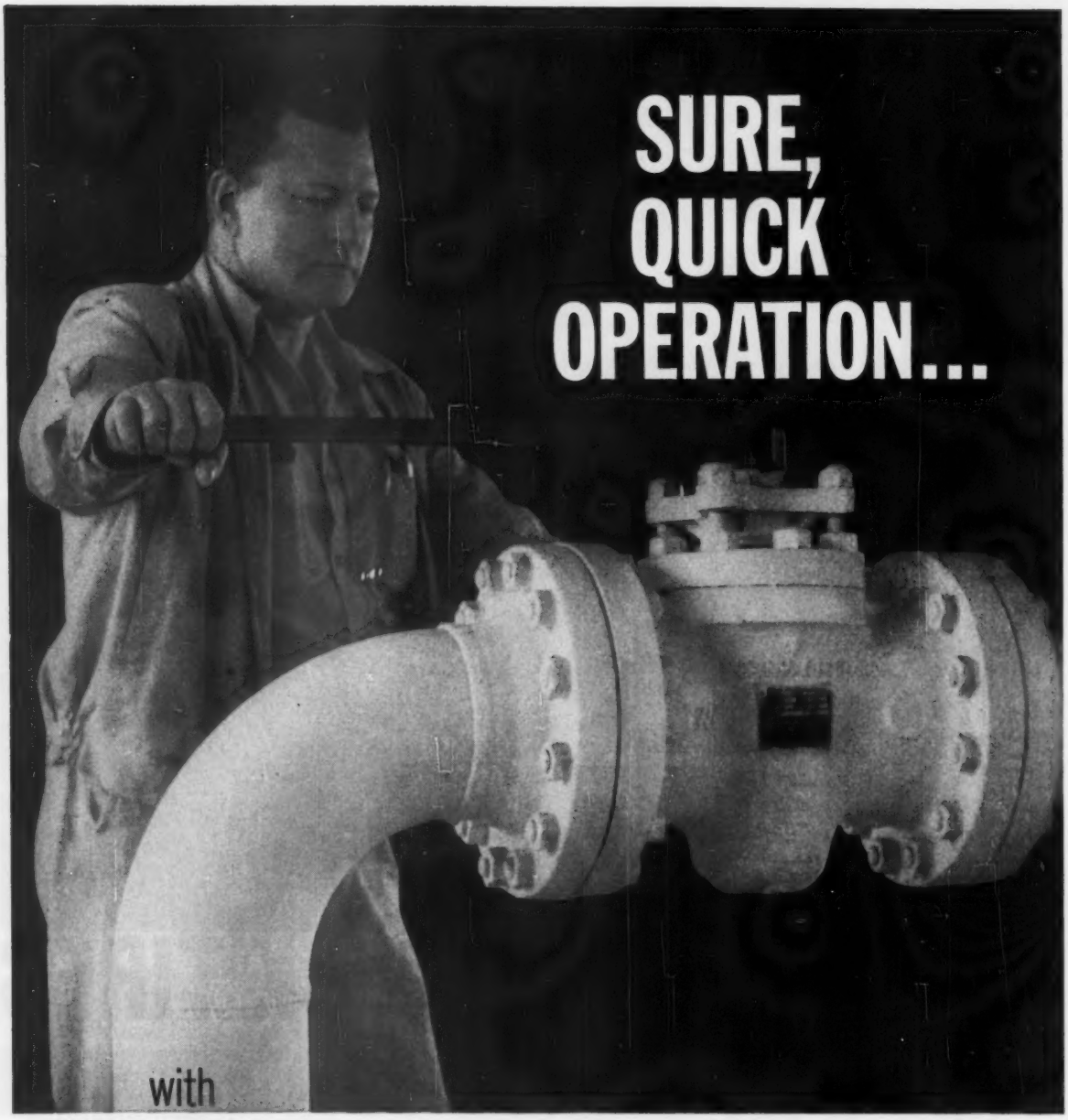

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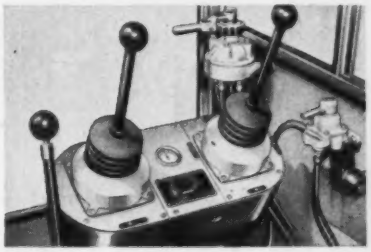
The turntable revolves on the exclusive Lorain "Shear Ball" mounting, which is like a huge, sealed "ball bearing." This design feature eliminates the adjustment, lubrication, and maintenance of rollers, roller path, and center pin and nut.



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New torque converter drive automatically adjusts engine torque to match digging demands. The engine can't stall—it hangs on to crowd until the most unyielding rock is in the dipper.

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Add to these "big 4" advantages a selection of two crawler sizes for most efficient operation. One is 15′ 6″ long x 11′ 10″ wide for general-purpose use as shovel, crane, dragline, clamshell or hoe. The second is extra long and extra wide (18′ 6″ x 14′ 2″) for maximum crane lifting capacities and wide-radius dragline and clamshell work. Both are full-air controlled.

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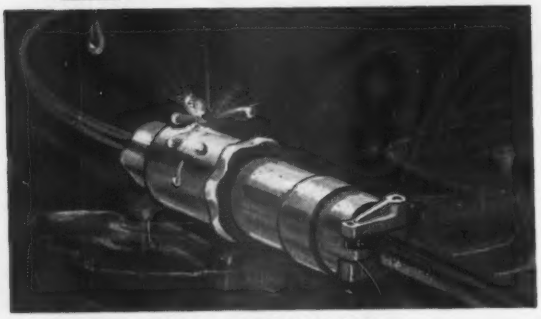

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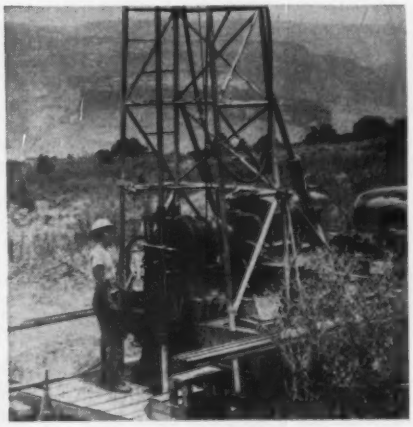

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Wyoming *(Continued)*

ping about 250,000 yards of overburden from its new open pit mine in the Gas Hills area.

Chapman-Morehouse was expected to begin mining operations in mid-October under a contract. The open pit mine is located just north of the Dale B. Levi mines.

About $10,710,000 worth of uranium ore has been mined in Fremont County since 1955, the Wyoming Development Association was told at its annual convention.

Roy Peck, Riverton newspaper publisher, predicted that by 1966, Wyoming uranium ores and concentrates will have returned $486-million to mining and milling companies in Fremont County.

Purchase of two beryl claims on the south side of Copper Mountain in Fremont County has been announced by Greater Wyoming Minerals Corp.

IN CANADA

ONTARIO

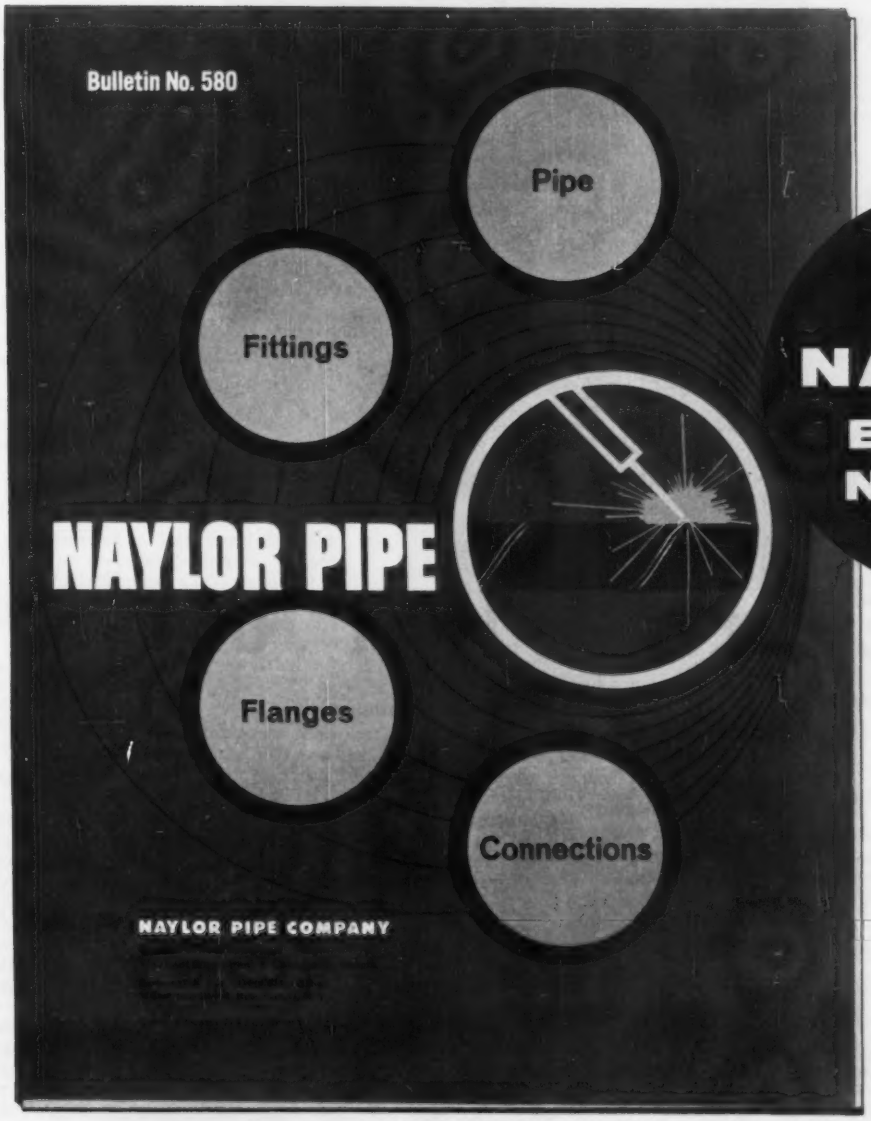
Kerr-Addison Gold Mines celebrated an historic milestone recently with the pouring of its 5-millionth oz of gold. The Kerr mine in the Larder Lake area was brought into production in May 1938, on a mill rate of 500 tpd. Currently, 4,500 tpd are treated. The mine is now the largest gold mine in Canada and, from ore indications to date, is still in its primary stage.

Some improvement has been noted in recent months in sales of Steep Rock Iron Mines. To early October this year some 850,000 tons had been shipped from the company's mining operation at Steep Rock Lake. It is expected that this year's total will be between 1.1- and 1.2-million tons against 2.3-million tons in 1957 and 3.3-million tons in 1956. It is anticipated that next year will be materially better.

Canadian Charleson has started production from its iron property at Steep Rock Lake. The first high grade iron ore moved to market early in October. The plant had started operations many months previously but output was stockpiled pending completion of the 1¼-mile C.N.R. spur line. Plant capacity is about 250,000 tons of concentrate yearly. Mining is being carried out by open pit. The final product grades around 58% Fe from the low grade gravels treated.

Greyhawk Uranium Mines plans to up uranium ore shipments to the nearby Faraday mill in the Bancroft area from the current 150 to 300 tpd by year end. Drilling from the 325-ft level has established downward projection of the uranium ore structure to the 450-ft horizon. A fourth level has been opened at 415 ft and a fifth level at the 500-ft horizon is planned following completion of drilling to that depth.

Helps ANSWER Your PIPE PROBLEMS



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- is the easiest impact breaker to maintain . . . output and product quality are kept high with the maximum effective use of wearing parts. *The result* —sharply reduced per ton maintenance charges.

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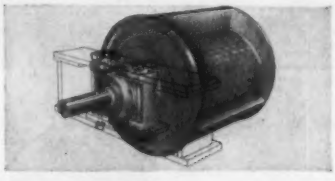
This superior rotor is found only in the KENNEDY Cubers.



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QUEBEC

The Mattagami area has stolen the limelight as one of the most promising mining districts to be turned up during the past year in eastern Canada. Sparked by the Mattagami Syndicate's major base metal discovery, enthusiasm has been reinforced by the recent copper discoveries of New Hosco Mines and Kenneco Explorations, and by the current new base metal find of Orchan Mines.

The Orchan discovery lies about 3,000 ft southeast of the Mattagami Syndicate orebody in what is described as the same geological formation. Drilling was started to test one of several electromagnetic crossovers revealed in survey work. Assays on the intersection in the discovery hole show over-all core section of 127 ft averaging 7.67% Zn, 0.54% Cu, 1.25 oz Ag and 0.016 oz Au per ton from 92 to 219 ft. Drilling of additional holes is continuing.

New Hosco Mines has stepped up drilling on its discovery property on Allard River with three drills currently in operation. The drilling is to be continued throughout the winter. Recently the company has started to test the main structure of depth with first indications encouraging. The program has now been broadened to test other geophysical indications in addition to the main anomaly.

Macfie Explorations has started diamond drilling on a copper prospect located some 17 miles west of Noranda. The test is designed to probe possible downward continuation of a wide shear zone in which massive and disseminated copper sulphides were found in surface exploration. The hole will also cross an area below an anomalous zone indicated by recently completed geophysical surveys.

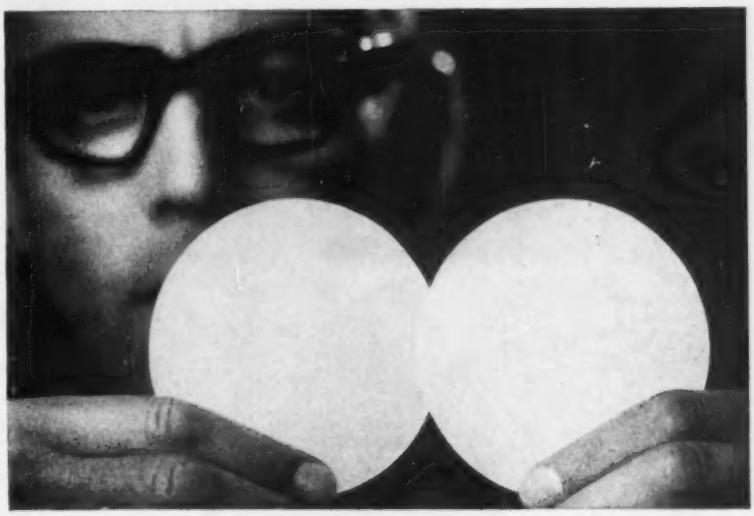
Results of a joint drilling program on the mutual boundary of Barnat Mines and Canadian Malartic Mines in the Malartic area have apparently been sufficiently encouraging to warrant further exploration. Both companies will launch their own individual programs. It is expected that Barnat will continue diamond drilling in the boundary area, while Canadian Malartic is stepping up an underground drive on the 750-ft level to the area of the ore finds. Best results in the joint drilling reported to date was in No. 3 hole, which cut a 60-ft section from 598-658 ft returning an average of 0.193 oz Au or $6.75 per ton. This included a 30-ft section averaging 0.342 oz or $11.97 per ton.

Norlartic Mines estimates indicated ore reserves at its Malartic area property at more than 1-million tons. It is now anticipated that when ore shipments are started to the nearby mill of Malartic Gold Fields, the daily rate can be upped to about 1,000 tons, compared with 400 tons previously planned. Plans are currently being considered to deepen the shaft on the property another 400 ft to open three new levels.

A detailed diamond drilling program has been initiated by Consolidated Zinc Corp. of Canada on the Consolidated Vause property, adjoining north of Waite Amulet in the Noranda area. The present drilling consists of a series of shallow drill holes to outline what is believed to be a small lens of high grade copper. Tonnage indications are not large but there is possibility that drilling might find extensions. A second drill is being used to test indications in other sections of the property and this work will be extended onto the adjoining Macdonald Mines group also under option to Consolidated Zinc.

Work has started on clearing the right-of-way for the 193-mile railway being built from the St. Lawrence River north to the large iron ore deposits of Quebec Cartier Mining Co. at Lac Jeannine. Completion of the road is scheduled for late fall of 1960. First carloads of ore are expected to be brought out by Christmas of that year. The company has recently awarded contract for construction of an office building, dormitory, cafeteria, and auxiliary buildings and services at Port Cartier. A 200-mile access road from Port Cartier to Lac Jeannine is now completed.

An agreement has been concluded by Copper Rand Chibougamau with Merrill Island Mining Corp. for treatment of



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America's super-quality line—with a 34-year record of keeping performance *up* and costs *down!* Five types—to fit practically any service condition. All assembled, adjusted, lubricated and *sealed* at the factory for precision performance—long life—dependability.

SPECIAL DUTY TYPE →

- Designed for extreme precision and high load capacities.
- Fully self-aligning.
- Special Duplex Timken Roller Bearing with tapered bore.
- Split tapered sleeve with straight cylindrical bore extends through entire length of housing.
- Easy to mount or demount. Adapter nut (or collar) clamps adapter sleeve to shaft with extreme firmness.
- Automotive type piston ring seals. Bearing is sealed both on and off the shaft.
- Rugged semisteel outer housing.
- Elongated bolt holes provide for lateral adjustment.
- Special dust cap protects lubrication fitting.
- Shaft sizes 1¾" to 8". Ask your local Dodge Distributor—or write us for Bulletin A670 giving complete technical data on America's most complete line of mounted bearings.

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WITH LUKENS "T-1" STEEL!
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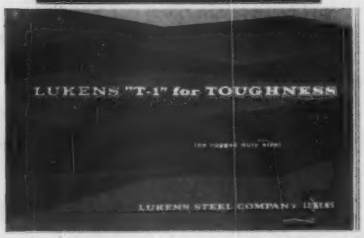
LUKENS ®



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■ Wherever rock and gravel, coal and ores come in violent contact with machine and equipment parts, Lukens "T-1" steel—*especially extra tough 321 min. BHN quality*—fights back at wear and abrasion with spectacular success.

It is readily fabricated. You can form or weld it in the field or shop, from stock plate sizes immediately available. It can be used to replace or repair worn bucket teeth, truck and mine car bodies or liners, dozer blades, dipper sticks, crusher teeth, chutes, and many other parts.

Far stronger for its gage than conventional steel, it requires less metal to do equivalent jobs. It remains tough even at sub-zero temperatures.

Contact your nearest warehouse listed below, or write Manager, Marketing Service, 144 Lukens Building, Lukens Steel Company, Coatesville, Pennsylvania. Ask for special bulletin, *"Lukens 'T-1' for Toughness."*

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Cleveland 6, Ohio, Mills-Wolf Steel Co., 10006 Carnegie Avenue
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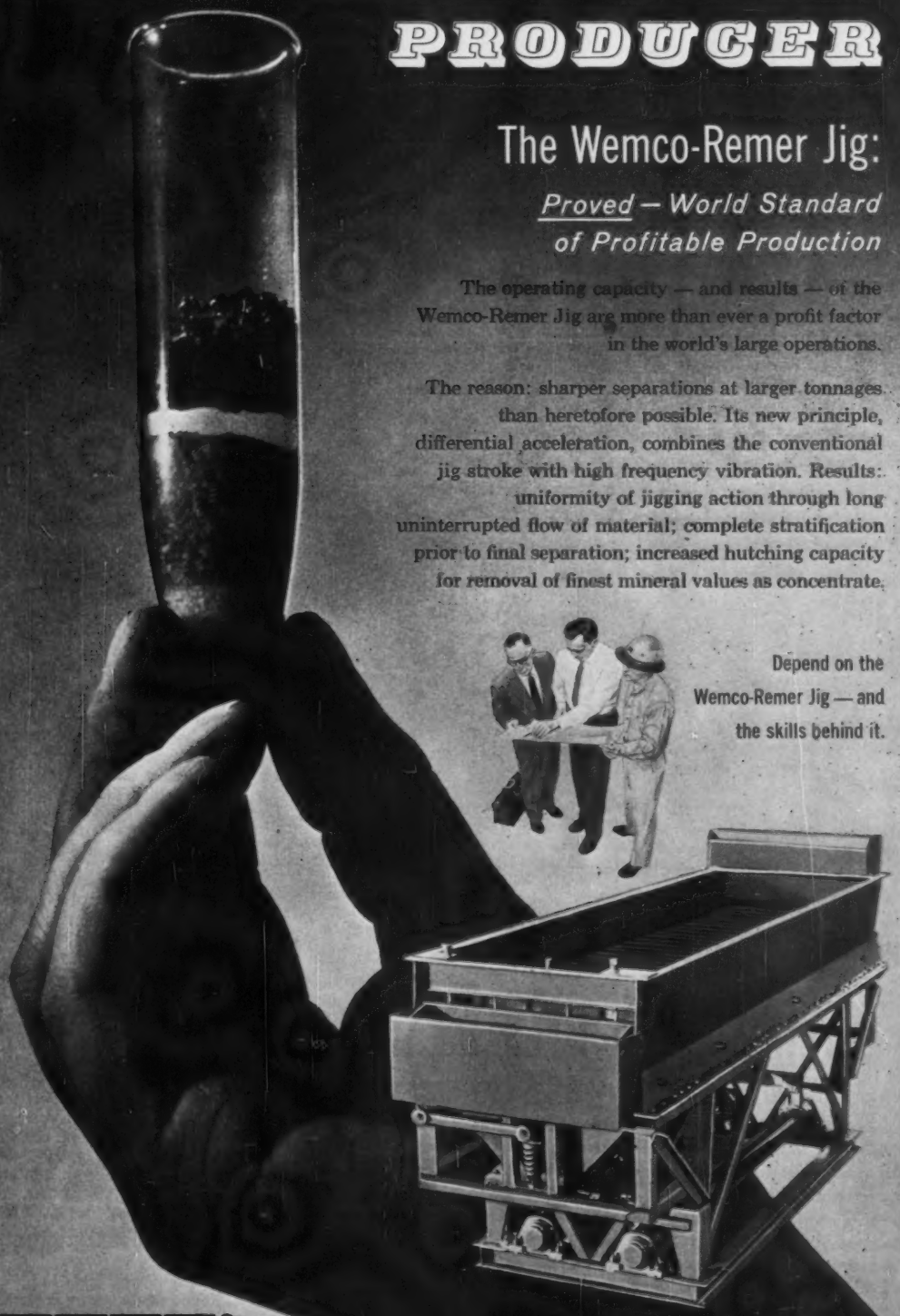
The operating capacity — and results — of the Wemco-Remer Jig are more than ever a profit factor in the world's large operations.

The reason: sharper separations at larger tonnages than heretofore possible. Its new principle, differential acceleration, combines the conventional jig stroke with high frequency vibration. Results: uniformity of jigging action through long uninterrupted flow of material; complete stratification prior to final separation; increased hutching capacity for removal of finest mineral values as concentrate.

Depend on the Wemco-Remer Jig — and the skills behind it.



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Quebec *(Continued)*

18,000 tons of stockpile ore at the Copper Rand property in the Chibougamau area. Merrill Island is presently operating at about 450 tpd and the company plans to treat about 900 tons of Copper Rand ore per week. Copper Rand recently concluded an agreement to take over managment control of the adjoining Chibougamau Jaculet Mines.

Tazin Mines Ltd. reports that it will undertake a diamond drilling program after freeze-up on its Cavelier Twp., Quebec, as well as in the Burntbush area of Ontario.

Mid-Chibougamau Mines Ltd., Montreal, plans geophysical work and diamond drilling after freeze-up jointly with Conwest Exploration Co. Ltd. in Valrennes Twp.

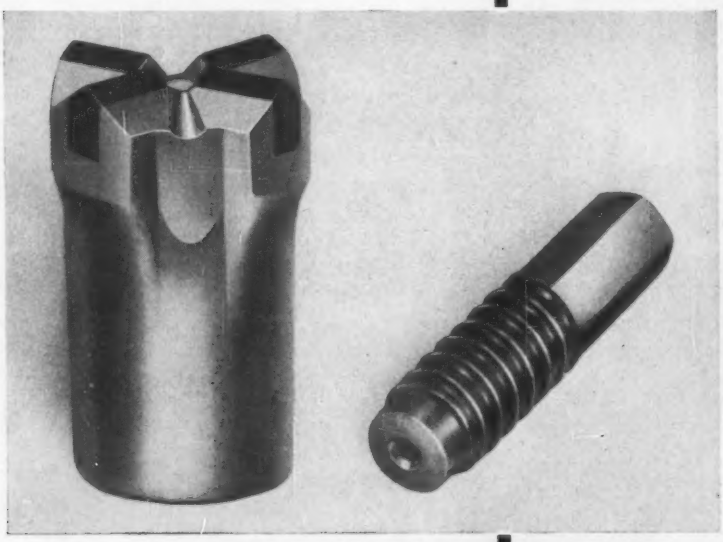
Chess Mining Corp. claimed that it recently signed an agreement with Phelps Dodge Corp. of Canada Ltd. for exploration of Chess's property in the Mattagami area.

Under terms of the agreement, Phelps Dodge undertakes to explore the property over a period of up to three years. The program will be carried out under a series of option periods. The agreement also stipulates certain option cash payments to the Chess Mining Corp.

The Mattagami property consists of 50 claims, approximately 2,000 acres, situated in Isle Dieu Twp. on both sides of the Allard River.

L. J. Severson, president of Quebec Cartier Mining Co. recently announced that a contract to build an office building, dormitory, cafeteria and auxiliary buildings and services at Port Cartier has been awarded to Komo Construction Ltd., Quebec City. These facilities will provide living quarters and office space for the company through its construction stage.

A temporary cargo dock for the unloading of construction materials and equipment at Port Cartier is being constructed by Perini-O'Connell-Quemont and will soon be completed.



Where will 200 and 400 SERIES ROK-BITS *improve your drilling operations?*

Brunner & Lay 200 series carbide Rok-Bits; gauge sizes: 1½"; 1⅝"; 1¾"; 1⅞"; 2"; 2⅛"; 2¼". 400 Rok-Bit sizes: 1⅝"; 2"; 2⅛"; 2¼" and 2½".

Drilling 20 to 30 ft. blast holes is by all odds the fast, low cost method for most mine operators today. Brunner & Lay has the accepted tools for such medium long hole drilling—200 and 400 series carbide Rok-Bits and ⅞" and 1" hex alloy sectional steel. Would this drilling technique improve your operations? Would it solve a problem for you? Check with your Brunner & Lay representative. He can help you. Ask, or send, for NEW bulletin DA 1-58. Brunner & Lay, Inc., 9300 King St., Franklin Park, Ill. 76 progressive years. Sales & shop service: Albuquerque; Asheville; Birmingham; Dallas; Denver; Los Angeles; Sacramento; Seattle; Philadelphia; Portland; Lachine, P.Q.

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BRITISH COLUMBIA

Bethlehem Copper Corp Ltd. has an underground program under way to assess the full value of its Highland Valley ore bodies. The current program calls for a total of 9,700 ft of crosscutting and drifting of which 950 ft has been completed; 1,000 ft of raising and 15,000 ft of diamond drilling.

The program was reported justified by the indicated large size of the copper ore bodies as determined by diamond drilling.

Bunker Hill Co. Kellogg, Idaho, reports that a survey has been completed for a six-mile road to connect the River Jordan lead-zinc property near Revelstoke with existing roads. No grade will exceed 10%. Geological mapping, resampling and surface stripping are being done under the supervision of Roger McConnell, chief geologist.

Ad Astra Minerals Ltd. is processing the first of 6-million yd of gold gravel in its Squaw Creek property. Testing has been completed, and dam plus a complete hydraulic sluicing operation has been installed. President R. C. Sissons said the old tertiary channel of Squaw Creek is estimated to contain 60-million cubic yd of gold bearing gravel.

Cowichan Copper Mines has started shipping ore to Japan—first cargo contained 8,000 tons of concentrate. The $1-million shipment comprised the first part of its $3-million contract to supply concentrates to Japan. Cowichan's mill has been rolling out concentrate for its stockpile. In August, the mill processed 10,202 tons of ore with average grade of 3.19% to produce 627,582 lb of copper.

Cassiar Copperfields Ltd. has bought six groups of claims in Michoacan, Mexico. Immediate exploration and development of a shear zone on one of the claims has been recommended.

Cascade Lode Mines Ltd. reports success in the program to mine gold in the Zeballos area on Vancouver Island. An extension of some of the Privateer veins are to be explored at depth. The company hopes to build up enough

Rear-Dump "Eucs" have payload capacities of 10 to 50 tons—are powered by engines of 128 to 670 total h.p. . . . have loaded speeds up to 41 mph.

For Lower Hauling Costs in Mines and Quarries Check Euclid Performance

Open pit mine and quarries the world over have standardized on Euclid equipment for moving earth, rock, coal and ore on tough off-the-highway hauls. They know from years of experience on their own operations that "Eucs" get more work done every shift—that production cost is lower than with other types and makes of equipment.

Euclid has a complete range of sizes and models to fit every job requirement—rear dump and bottom dump haulers, self-powered scrapers and the world's most powerful crawler tractor. Your Euclid dealer will be glad to provide a production-cost estimate on your present or planned operations—be sure to see him before you replace or add to your equipment fleet—and have him show you why Euclids are your best investment.

EUCLID Division of General Motors Corporation
Cleveland 17, Ohio

Bottom-Dumps carry 13, 17 and 25 cu. yds. struck . . . special coal hauler trailers have capacities of 25, 40 and 51 tons. Full length, unobstructed door opening make these "Eucs" ideal for dumping free-flowing material into drive-over hoppers.

The TC-12 Crawler has 2 engines and independent track drive . . . 402 net h.p. . . . full power shift . . . top speed of 7.8 mph. This "Euc" tractor has unequalled work-ability for heavy dozing, ripping and similar work in mines and quarries.

This "Twin" Scraper has 2 engines with Torqmatic Drive . . . all wheel drive permits self-loading . . . struck capacity is 24 cu. yds. There are six other Euclid Scrapers, overhung engine and six wheel types, with struck capacities ranging from 7 to 24 yds.—9 to 32 yds. heaped.

GM GENERAL MOTORS EUCLID

EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

B. C. *(Continued)*

sources of gold ore to feed a 150-ton mill.

Craigmont Mines is continuing drilling with two machines at Merritt—starting on a 2,930-ft adit and paralleling the known 1,200-ft long ore zone on its north side. To facilitate bulk sampling and provide for future mining operations, six crosscuts at 200 ft intervals will penetrate the ore zone.

Development is being undertaken by Canadian Exploration Ltd. through a new company, Birkett Creek Mine Operations Ltd. A permanent three-mile road has been built into the property.

Magnum Copper Ltd. & Centennial Ltd. have taken a joint option to purchase the Hank group of mineral claims near Merritt from William Taylor & Associates. The 36 claims adjoin a group of 65 already under option to Centennial.

New Hamil Silver-Lead Mines Ltd., which started drilling on its Louis group of claims in the Highland Valley at the beginning of September, has now reached a depth of 180 ft. The drill was in ore at 134 ft and out again at 170; it is expected to be back in ore at 190.

Giant Mascot Mines expects to double its production of refined barite within the month. It is now producing 50 tons a month and shipping to Tacoma.

Torwest Resources Ltd. is carrying out an exploration program in the Highland Valley and at Merritt under the direction of consulting geologist Dr. Aaron Aho. A geophysical, geochemical and stripping program is under way on the 14-claim group south of Craigmont and on the 50-claim Raja group east of Bethlehem in Highland Valley.

Vanex Minerals Ltd., a new U.S.-backed company, has acquired 64 more claims southwest of Merritt, and 48 claims in the Meadow Creek area north of Merritt, bringing the company's holdings in the area to 115 contiguous claims. Vanex also has entered into an operational agreement with Dunmore Mines Ltd., whereby Vanex will conduct a magnetometer survey on the 50 mineral claims owned by that company. These claims are located south and east of the Vanex holdings.

The engineering report in the 115 claims indicated an anomaly about 1,500 ft wide and 4,000 ft long.

NORTHWEST TERRITORIES

Canadian northern affairs minister Alvin Hamilton made public for the first time the theory and long-range program planning behind the Canadian government's efforts to develop a system of access and connecting roads for the mining areas of the Northwest Territories.

"Our plans are based on the strategy that the Northwest Territories and Yukon Territory must be approached from the south," he said.

Heretofore, although air travel into the Territories has been based on southerly departure points, the bulk of freight into the vast area has come down from the north, by summer barge, via the Mackenzie River system.

Hamilton said the federal government will build a grid system in the Territories and the Yukon, and access roads from the four western Canadian provinces will join these grid roads.

Saskatchewan's $15-million road from LaRonge in central Saskatchewan to Uranium City in the Beaverlodge uranium mining area, a three-year project now under way, will be tied to a road around Great Slave Lake, from Yellowknife on the north shore of the lake to Fort Smith. This road, said Hamilton, will be surveyed in 1959, and may eventually be tied in to a road to Eskimo Point on Hudson's Bay.

ALBERTA

In passing resolutions at its concluding sessions, the National Northern Development Conference called for the granting of special incentives in the field of taxation to encourage private development of Canada's mineral rich northern areas.

METAL ION RECOVERY PROBLEM SOLVED–

PROVED IN COLORADO URANIUM MILL

This revolutionary installation uses CST (Trade-mark) exchangers by INFILCO, which –

CONTACT – Provide excellent mixing and intimate contact of liquid and resin for rapid ion exchange;
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Evidencing INFILCO eminence in engineering, this is the first installation for truly continuous commercial-scale, counter-current ion exchange of uranium. Applicable also to recovery of other metal ions from slurries, turbid liquids or clear liquids, it offers you substantial savings in capital investment and operating and maintenance costs. It is discussed in literature. Write today for Bulletin No. 1930.

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The ONLY company IMPARTIALLY offering equipment for ALL types of water and waste processing—coagulation, precipitation, sedimentation, flotation, filtration, ion exchange and biological treatment.

Illustration from Agricola's De Re Metallica (1621)

Special attention was necessary

In olden days, every piece of ore presented special problems for the processor. It had to be handled separately . . . carefully placed under a clumsy stamp . . . and slowly crushed bit by bit.

Today, it is just the opposite. Modern plants produce a never-ending stream of properly sized ore. For they have efficient grinding mills that often use CF&I Grinding Balls and Rods. Always made of special analysis steel that has an ideal balance between toughness and hardness, CF&I Grinding Balls and Rods combine optimum grinding ability with maximum wearability.

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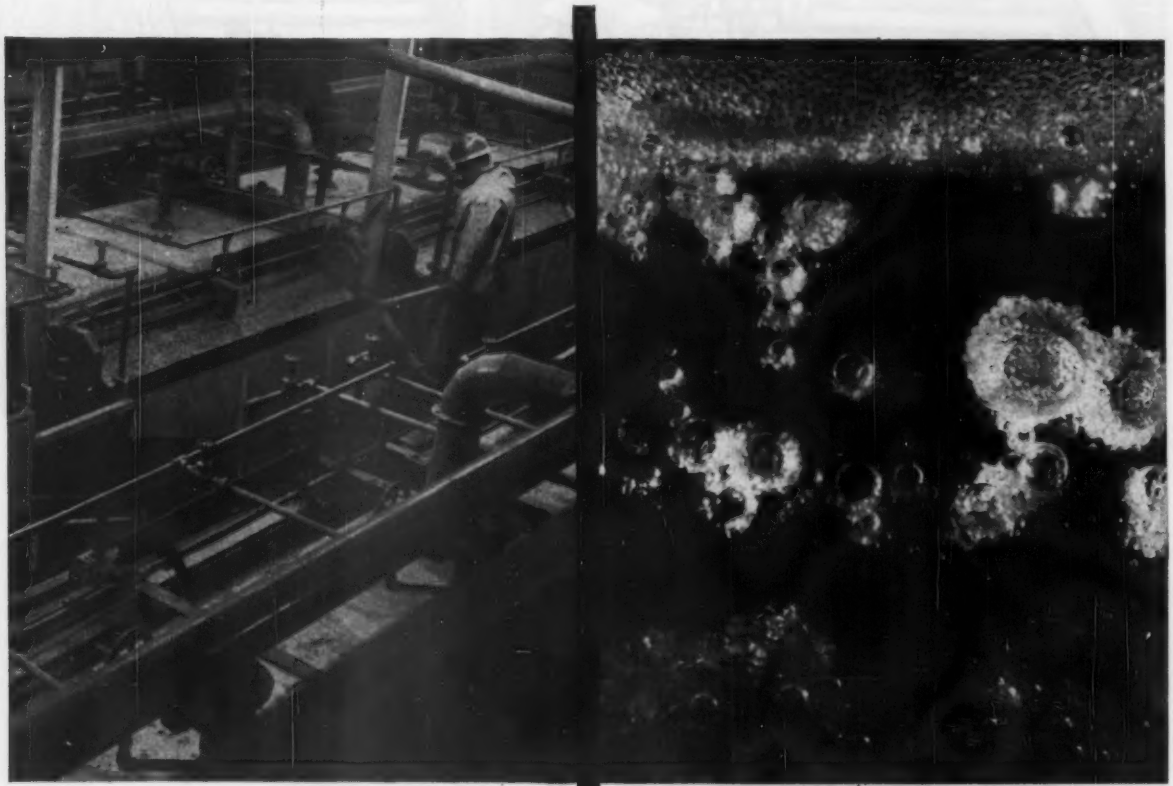
Pamak, Hercules Distilled Tall Oil Fatty Acids, offers a low-cost, dependable source of high-quality Oleic-linoleic Acids for flotation

Pamak is now being used successfully as a collector in the beneficiation of such minerals as barytes, feldspar, fluorspar, hematite, hydrous magnesium oxide ores, kyanite, phosphate rock, and spodumene.

Hercules' flotation laboratory and field service are at your disposal to determine how Pamak, the low-cost, dependable, high-quality collector, can benefit you. Write for further information.



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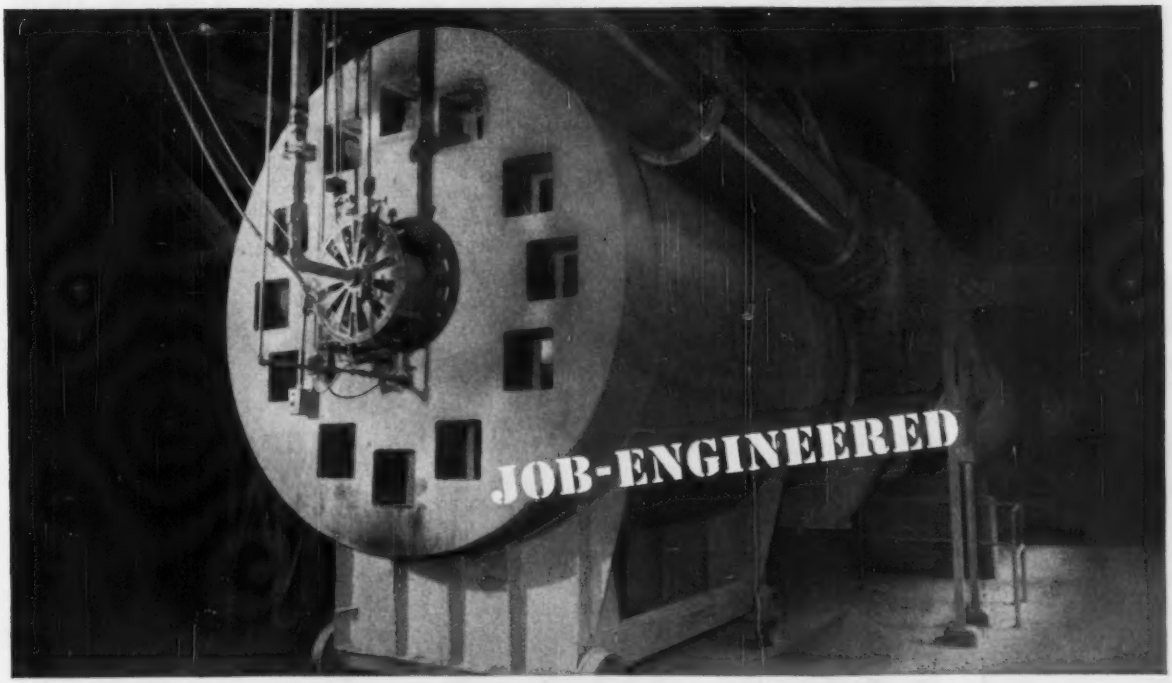


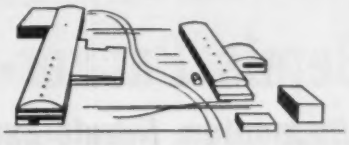
MINING FOR FOOD TO FEED THE EARTH— NEW CARLSBAD PLANT OF NATIONAL POTASH IS ON STREAM WITH STANDARD-HERSEY DRYERS!

Deep into the earth—1800 feet, deepest in the nation's potash industry—National Potash near Carlsbad, N. M., is mining for food to feed the earth, so that the earth will feed man better! Designed refinery capacity is 400,000 tons per year. And at the heart of this operation are 60-foot-long twin rotary dryers—*job engineered* Standard-Hersey dryers—designed and built by Standard Steel Corporation... a world leader in designing and manufacturing dryers, granulators, and coolers. Wide range and flexibility in Standard-Hersey dryers help you to produce almost any desired grade of fertilizer.

No matter how tough the problem, Standard Steel's *job engineering* solves it.

IF YOU HAVE A PROCESSING PROBLEM!

Standard Steel welcomes the opportunity to discuss with you any problems you may have in drying, cooling, or calcining. Our laboratory pilot testing equipment determines beforehand the best equipment for your problem.



STANDARD STEEL ACQUIRES LEADER IRON WORKS

Since Leader 1888

To meet the ever increasing needs of its world-wide customers, Standard Steel Corporation recently purchased the Leader Iron Works at Decatur, Illinois. Founded in 1888, Leader is well known for its work in the food, chemical and petroleum industries. In addition to its customary fabrication Leader will now manufacture Standard's line of heavy processing and road construction equipment.

STANDARD STEEL CORPORATION

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Midwest Offices & Plant **LEADER IRON WORKS** *Decatur 60, Illinois*

(Division of Standard Steel Corporation)

ROTARY DRYERS • KILNS • COOLERS • ASPHALT PLANTS

Alberta (*Continued*)

An address by J. N. Botsford, Toronto, general manager of Gunnar Mines Ltd., focused attention on proposed tax concessions as a means of spurring development. Stated Botsford:

"Pioneer companies continue to be saddled with the burdens of provincial royalties, education and hospitalization taxes and municipal assessments. It is unfortunate that the efforts of companies which are building new communities in the north . . . are not recognized by our provincial governments.

"Revised federal and provincial taxation rates, graduated according to latitude, would provide one of the greatest incentives for private enterprise to enter into this national project of developing the north and establishing northern communities."

Botsford said that "we appreciate the arrangement whereby the federal government grants new mines a three-year tax-free exemption."

He added, however, that "northern communities do not benefit from federal spending of the Canadian tax dollar to the same extent as communities in more southerly latitudes . . . (and) the provinces make little attempt to return to the area any portion of the royalties derived from northern development."

FLASH!
A newly developed Bemis explosives bag is now being tested. The bag has kept contents perfectly dry even though submerged in a mine pond for days. Write or wire for details.

Packer-Ette at United Electric Coal Company's Fidelity Mine packing Bemis-made waterproof (laminated) bags. Packer-Ette is equally efficient in packing polyethylene bags or tin cans.

Bemis Packer-Ette

Packs Ammonium Nitrate Explosive With Greater Speed, Economy, Accuracy, Cleanliness

- 50 percent increase in production
- Two-man operation, instead of three
- Accuracy to 3 ounces on a 33-lb. bag
- Instant adaptability for packing waterproof (laminated) bags, polyethylene bags, or tin cans
- Complete cleanliness

These five major benefits were reported by United Electric Coal Company when it began packing its formulation of ammonium nitrate explosive on a Bemis Packer-Ette bag packing machine.

The Packer-Ette maintains a steady production of six bags or cans per minute, with no delays for hand-tamping or cleaning up overflow (there is no overflow with Packer-Ette), and no guesswork on weights.

Write or phone us for *complete* information about this new, efficient, and economical method of packing ammonium nitrate explosives.

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Bemis

SASKATCHEWAN

Approximately 45 miles north of La-Ronge in northern Saskatchewan, several companies, among them Westore Mines, Dee Explorations, Embassy Mines, Trenton Mines, Laronx Mining and Regal Mines, have acquired property and staked out 200-odd claims in a line of strike extending 8,000 ft. The reported mineral find was set off by trapper William McLeod, on the basis of samples found in a long gully lying beside one of the huge iron sulphide dikes which streak the area. Other samples from the area indicate lead and zinc values up to 13% with 4 to 6 oz of silver, some copper, and traces of gold.

IN LATIN AMERICA

According to recent information, iron ore has been discovered in the State of Colima, Mexico. The deposit, known as the Nahuatl, is 7 miles from Colima and 49 miles from the port of Manzanilla. It is estimated that the deposit contains 53.8-million tons of magnetite ore at the contact of intrusive rock and Upper Jurassic sediments. An assay of 4 samples shows a range of 57.9 to 63.4% iron, 6.0 to 13.6% silica, and 0.04 to 0.09% phosphorus. Two claims of 50 hectares and 3 claims of 100 hectares each have been granted to Minera Ducro, S. A., a company of American and Mexican ownership.

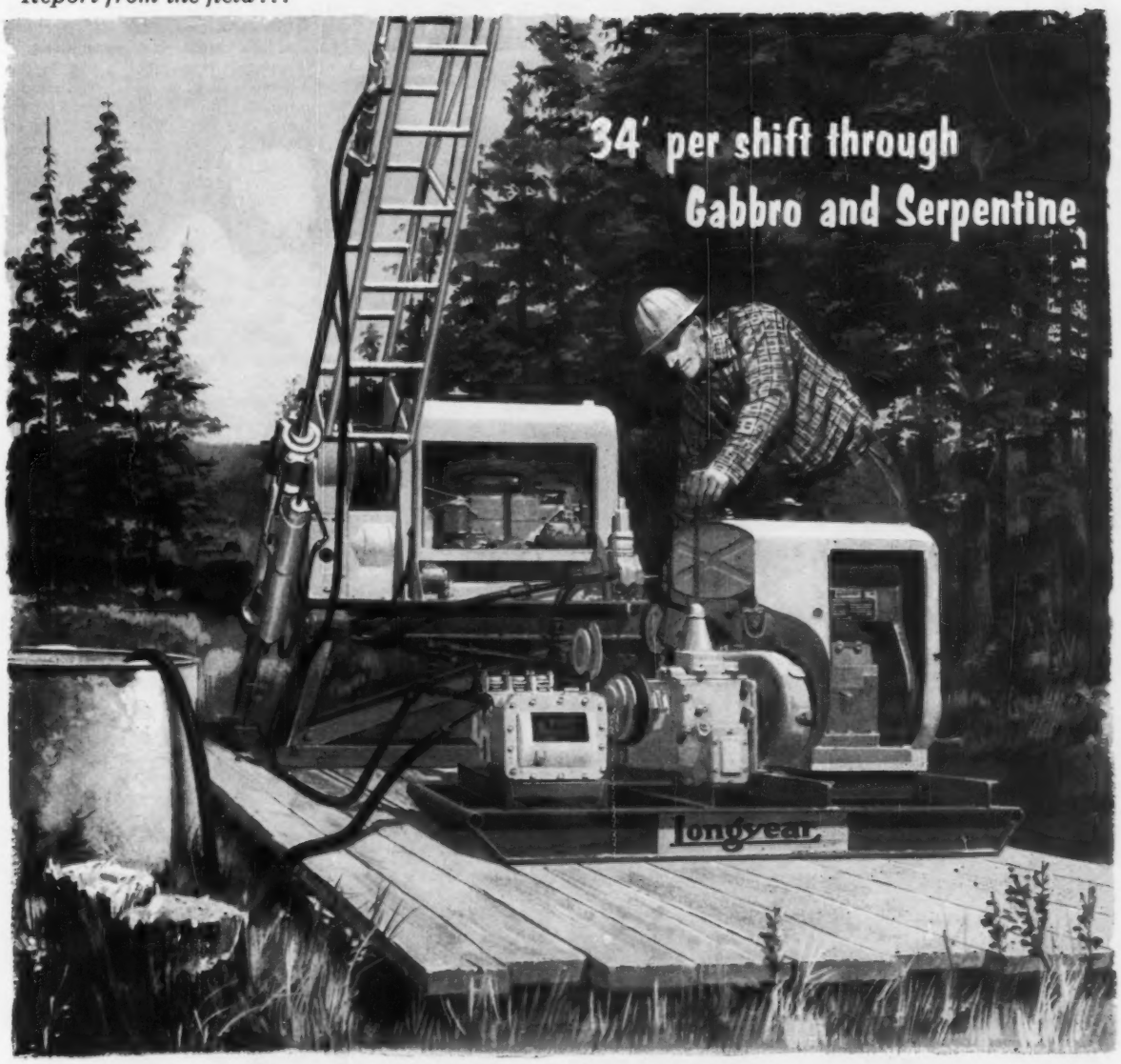
The government recently announced that the Cerro de Mercado iron-ore deposit in Durango has been placed in the national Mineral Reserve. Present concessions on this "iron mountain" are not affected in any way. It has been reported that a combined government-private capital Renn-Krupp-process plant will be established in Durango. Press reports state that the total investment in the project will be about $4.8 million.

PERU

A Japanese mission of six mining engineers will leave Tokyo by Nov. 19 for Peru to investigate the mineral resources of the Pacific Coast region, according to an announcement made by the Japanese Association for the Development of Overseas Mineral Resources. The mission is especially interested in copper, lead and iron ores. The Association was formed in November 1957 by 22 leading Japanese mining companies.

Members of the mission are: Takeo Amamori, chief geologist of the Sumitomo Metal Mining Co.; Takeshita Miyajima, geologist of the Nippon Mining Co.; Tabashi Sakuna, geologist of the Mitsui Mining & Smelting Co.; Yasuo

Report from the field . . .



Longyear Transmission Pumps put right volume of water into hole without bypassing

Longyear Transmission Pumps help hold the line against the continually rising cost of drilling. Here are 4 reasons why these 5 speed pumps help cut drilling costs:

1 The volume of water pumped into the hole can be controlled over a wide range of various depths.

2 Bypassing is eliminated. Thus burning and mudding of bits without the drillers knowledge is unlikely.

3 Closed current pumping is possible at every stage of the hole without changing pump liners and sheave ratios.

4 Engine runs near recommended operating speeds at all times thus minimizing carbon and sludge deposits, reducing wear on working parts, increasing engine life.

Longyear Transmission Pumps are matched in advantages and performance by other components of Longyear. *Coordinated Systems* for diamond drilling, including finest drills, drill rods, diamond bits, core barrels, and other supplies.

For complete information on Longyear Transmission Pumps, write for Longyear World No. 1, E. J. Longyear Company, Minneapolis 2, Minnesota.

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THE WORLD IS OUR WORKSHOP

Peru (*Continued*)

Koga, chief of the mining section of the Nittetusu Mining Co.; Hisayasu Toyoyoshi, geologist of the Mitsubishi Metal Mining Co.; and Teruo Homma, geologist of the Furukawa Mining Co.

JAMAICA

The Jamaica Cooper & Iron Co. Ltd. has found a very promising low grade copper deposit in the Bellas Gate area, according to company secretary-treasurer, J. P. Dion.

The company, a wholly owned subsidiary of the Jamaican Mining Co., Ltd., Toronto, Canada, has been prospecting a 410 sq mile area. It has also discovered two manganese areas which it hopes to develop more fully within the next six months.

The Kaiser Bauxite Co. will begin experiments to see if starch can be made from Jamaican cassava at a competitive price with starches from other sources, Brig. D. G. Farquharson, vice president and administrative manager, recently stated.

Farquharson emphasized that these will only be experiments and that no high hopes should be entertained for success. His comment was made because the local Jamaican press has overemphasized the commercial possibilities.

The cassava experiment is one of the supplementary endeavours of the Kaiser in Jamaica. The company during the quarter ended June 30, 1958, shipped 793,183 long dry tons of bauxite from the island.

CHILE

Andes Copper Mining Co. has changed its original estimate of the cost of placing its new El Salvador deposit into operation. The figure has been raised from $80-million to $104-million. Mill's first section will begin operating in May 1959. Total mill capacity will be between 25- and 30,000 tpd.

The cost of the new government copper smelter to be built at Ventanas, Valpariso Province, will be around $12-million and will have an initial capacity of 165,000 tons of charge per year with a production of about 27,500 tons of 99.3% blister. Final capacity may reach 500,000 tons a year.

The construction of the Pan American highway in the northern provinces of Antofagasta and Tarapaca will permit the mining of several ore deposits which are now idle because of a lack of transportation.

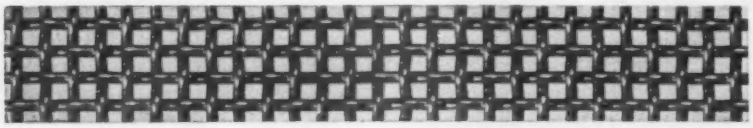
Compania Minera Cerro Negro is carrying out a diamond drilling program to increase the tonnage of ore blocked out in its new El Diablo deposit which has replaced the worked-out Pirquitas mine.

IN AUSTRALIA

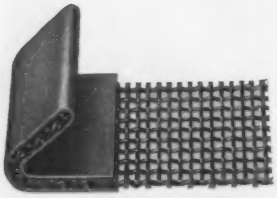
Western Mining Corp. Ltd. is forming a new company to be named Western Aluminium N.L., to prospect the company's bauxite deposits in the Darling Ranges, Western Australia. Preliminary sampling has disclosed commercial grades of bauxite on the company's 6,250 sq mile reservation. A wholly-owned subsidiary of Western Mining Corp., Champagne Syndicate N.L., will prospect for bauxite on 625 sq miles near Wilga Basin and over 2,000 sq miles in the Tarraji River area where significant copper-bearing quartz outcrops have been discovered. Diamond drilling will start shortly to test the grade on six of the orebodies.

Central Norseman Gold Corp. N.L. has intersected a quartz reef in vertical diamond drilling 3000 ft north of the Princess Royal shaft. The reef was cut at a 285 ft depth and assayed 31.5 dwt. over 38 in. In the Regent shaft area, recent assays disclosed 36.4 dwt. over 63 in. and 16.9 dwt. over 48 in.

Metals Exploration N.L. has acquired 40% interest in a big new tin-bearing area on Cape York Peninsula. The company is at present bulk-sampling the Boulder outcrops where shallow shafts



TYLER SCREENS LAST LONGER

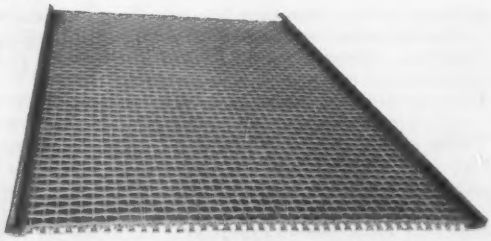


Tyler Type "AX" Hook Strip. For wire diameters from .047" to 5/16" inclusive.

Tyler Type "CX" Hook Strip. For wire diameters .041" and smaller.

Tyler Woven Wire Screens are woven with laboratory approved wires on precision machines. The high quality of Tyler Screens is apparent in their long life and service under the most difficult of screening conditions.

Tyler Screen Sections are furnished for all makes of vibrating screens in all meshes and metals. Each section is fabricated with the right type of edge or hook strip for the specification of screen cloth and to fit the particular make and model of screening machine on which it will be used.



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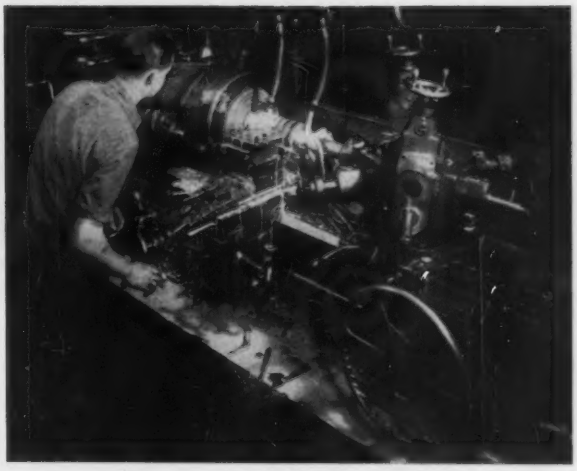
THE W. S. TYLER COMPANY
CLEVELAND 14, OHIO
Manufacturers of Woven Wire Screens and Screening Machinery

Metal users, save money!

simplify materials control... standardize manufacturing processes



by standardizing on two alloy steels... 4340 and 4620

4340 THROUGH-HARDENING—Use AISI 4340 for moderate-to-heavy section parts... to get maximum strength, toughness, reliability. It's readily annealed to facilitate machining... can even be machined as heat treated in many cases. Welds readily with normal precautions. Responds reliably to heat treatment.

4620 CARBURIZING—Use AISI 4620 for all except the very heaviest duty carburized parts. It is the steel least apt to distort in heat treating. Case hardens easily with excellent case toughness. Shows uniform response to treating. You can treat mixed furnace loads . . . eliminate a re-heating cycle . . . *save more money.*

AMERICAN STEEL WAREHOUSE ASS'N.

Easy to Get... Both these steels are carried by Steel Service Centers from coast to coast . . . ready for delivery on a "next door" basis. For a list of these sources, write: 67 Wall St., New York 5, N.Y.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

INCO TRADE MARK

Australia *(Continued)*

will be sunk to determine the width of the lodes. Previous sampling gave good assays over 300 ft lode length. Grade of ore mined so far to depth of only 10 ft was at least 8% tin and the tin-bearing area is estimated to cover at least 200 sq miles.

A major project was completed at Mt. Isa Mines Ltd.'s lead smelter when balloon flue was replaced by high velocity flue. At the copper smelter, a four-weekly production of 3,380 tons of blister established a new record while serious crane delays prevented an even better result. Improved tonnages are largely the result of better smelting conditions in the reverberatory furnace.

The Australian Minister for National Development announced on July 23, 1958, that the Commonwealth Government has decided to stockpile beryl ore. The following three reasons were given:

1. Beryllium has important uses in atomic energy for sheathing nuclear fuels in high-temperature reactors and as a moderator. World reserves of beryl are small, and it is essential for available reserves in Australia to be conserved.

2. The export of beryl ores and concentrates has been restricted since 1947, export under license being permitted to the United Kingdom only.

3. Arrangements are being made for purchasing beryl ores and concentrates, and for the present the price will equal that currently being paid. The program will be reviewed from time to time, when both the price and the possibilities of allowing some exports will be taken into consideration in fixing arrangements. He did not specify the quantity to be stockpiled.

About 8.5-million long tons of phosphate rock were discovered in the first stage of a big search for new phosphate deposits in the southwest Pacific and it is expected that large deposits will be uncovered.

The project is being conducted by Australian Bureau of Mineral Resources and about 8-million long tons were discovered on Bellona Island in the British Solomons. Smaller quantities were found on islands in the northwestern sector of New Guinea. They were mostly of low grade.

Australians are about to intensify their search because experts estimate that the big Nauru and Christmas Island deposits would be exhausted in about 20 years. In the next stage of the project, Fiji will be used as a base of operations.

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COPPER SULPHATE
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FLOTATION
For more than fifty years TRIANGLE BRAND COPPER SULPHATE has been the accepted activator for the removal of sphalerite from lead-zinc ores. It is 99% + pure and available in several sizes to meet your requirements.
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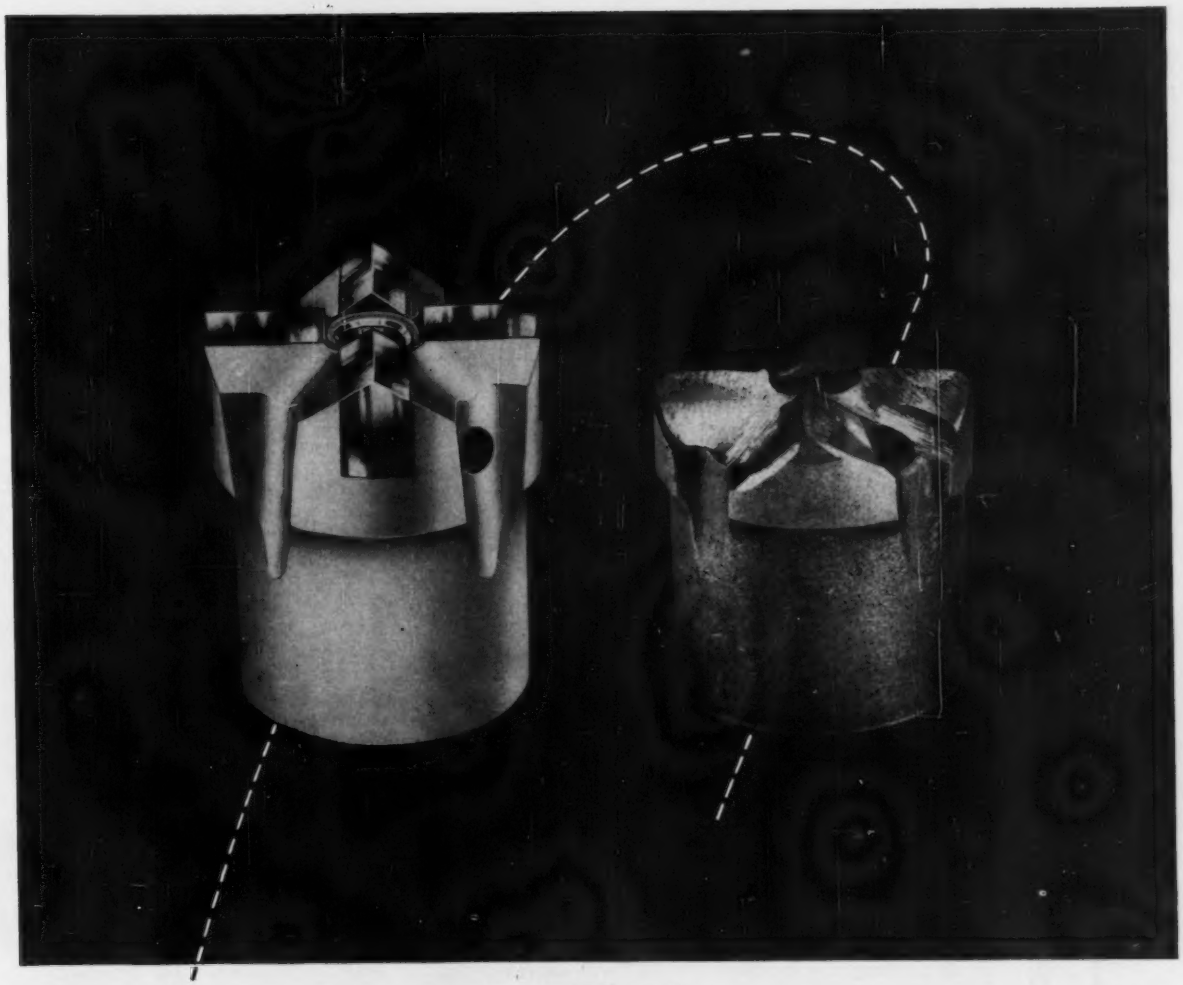
IN THE PHILIPPINES

Liberty Chromite Mining Corp., which owns a chromite property near Puerto Princesa, has recently concluded a contract with E. A. Godoy & Co., New York, under which Godoy becomes the exclusive agent and world-wide representative for the distribution of the company's chromite ore, with the exception of high grade metallurgical ore for Japanese market which is committed to Mitsubishi Shoji Kaisha, Tokyo.

The principal chromite deposit shows ore of exceptionally high refractory grade. A substantial tonnage has already been developed with good indications that further work can increase the ore in sight. The company has built a good pier with facilities for loading 600 to 1000 tpd. The first U.S. refractory grade shipment is expected in November.

Surigao Consolidated is still operating its old gold mine in Mindinao, in spite of a mine fire that lasted three months and required flooding the workings to end the disaster. The company is now doing some promising exploration work in western Pangasinan.

Marinduque Iron Mines valued its output from its three properties in Samar, Occidental Negros, and Marinduque at $778,000 in August. Shipments totalled $1,236,000, an all-time high for the company. From its Bagacay copper mine, 3,085 tons of copper ore, averaging 14.5%, were shipped to Japan. At Sipalay, 139,453 tons were milled, with an average copper content of 0.83%. Approximate metal content was 1,855,734 lb Cu. August shipments totalled $866,-



THIS JOY BIT DRILLED *46% Farther*... STILL MORE TO GO

YOU'LL FIND YOUR BIT SIZE IN THIS CHART

SHOULDER DRIVE	BOTTOM DRIVE	TAPER SOCKET
1½"		1¼"
1⅝"		1⅜"
1¾"		1½"
1⅞"		1⅝"
2"		
2⅛"	2½"	
2¼"	2¾"	
2⅜"	3"	
2½"	3¼"	
2¾"	3½"	
3"	4"	
3½"	4½"	
4"	5"	
4½"	5½"	
	6"	

Note: Shaded areas are X-Type, others are Cross Type

WRITE FOR FREE BULLETIN 172-4

Drilling Rock with a scleroscope hardness of 90-100 takes a lot out of most carbide bits . . . on this job, other bits were averaging 532 feet. Our illustration shows a Joy bit before and after drilling almost 800 feet in this formation. The average for Joy bits on the entire job was 781 feet.

Here's why: OFFSET WINGS allow drag-free rotation, faster removal of cuttings, easy reconditioning . . . DEEP SLOTTED CHIP WAYS allow cuttings to escape; bit does not regrind its own cuttings . . . INSERT STAYS IN because of new brazing method . . . SPECIAL ALLOY STEEL BODIES heat treated for shock resistance and high fatigue life . . . PRECISION MILLED THREADS instead of tapped threads.

These are the reasons why Joy tungsten carbide bits give extra footage . . . and only Joy bits have all these features. Let your Joy representative prove it to you. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WSW C 6595-172

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Wagon Drills

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OR ON THE
SURFACE

YOU'LL CUT EXPLORATORY COSTS IN HALF WITH THESE DIAMOND CORE DRILLS

SUPER PIONEER

Here's a rugged compact light-weight drill you can take anywhere. The Super Pioneer eliminates guesswork by giving a true core sample to depths of 100' or more. Designed for one-man operation, drills at any angle in all formations. Gasoline-powered drill and pump weigh just 35 lbs. each.

Basic kit includes drill, pump, and accessories. Rods and bits additional.

$885.00 FOB Spokane

SUPER SCOUT

This all-new air-powered one-man drill sets up and tears down in minutes, eliminating lengthy traffic tie-ups. Hand operated hydraulic feed supplies drilling pressure up to 1500 lbs. Anchor column provides drill support at any angle with or without back wall. Drills in any direction or at any angle to depths up to 100' with exceptionally high core recovery. Weighs just 85 lbs.!

Complete unit includes drill, hydraulic feed, anchor column, hoses, 50' of rods, core barrel, starting barrel, collar pipe, tools, and storage box.

$1175.00 FOB Spokane Diamond bits additional

DIAMOND DRILL CONTRACTING COMPANY

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EMPIRE DRILL

NEW YORK ENGINEERING COMPANY

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Philippines *(Continued)*

000, all to Japan.

During August, the Toledo copper mine of Atlas Consolidated milled 318,032 tions, a substantial pickup from the previous month when water and power shortages had curtailed production. Output totalled 6,648 tons of copper concentrates, estimated to yield 3,701,875 lb of copper, valued at about $992,000. New boilers for the power plant have been purchased in U.S. and are expected to be in service in November. During the six-month January to June period, the company milled 1,532,000 tons of ore and recovered 18,553,000 lb Cu, 7,793 oz of Au, and 5,573 tons of pyrite. The iron mine at Mati, Davo, produced 44,000 tons of iron ore which was shipped to Japan. Total value of sales of all products exceeded $45-million. Because of the low price received for copper, averaging 21.5c a lb in the six-month period, the company reported a loss of $261,000 after all charges.

IN AFRICA

Conveyor and bucket belting plays a big part in transporting mineral sands from excavations in old sand dunes to the treatment plant at Umgababa Minerals Ltd., Natal, a mining venture which is being administered by Anglo American Corp.

Some $4.2-million has been invested in a large heavy minerals treatment plant which can take in about 7,000 tpd. At the other end of the plant, 300 tons of concentrates (ilmenite, rutile and zircon) representing the daily output, will have to be stored and loaded into railway trucks. Non-useable materials will have to be dumped.

From the hillside excavations, two feeder belts supply a 700-ft permanent conveyor belt sloping down the hillside and feeding on to another 700-ft belt. This in turn feeds the main intake feed belt to the ore storage bins and passes through a tunnel underneath the national road and over the main south coast railway line from Durban.

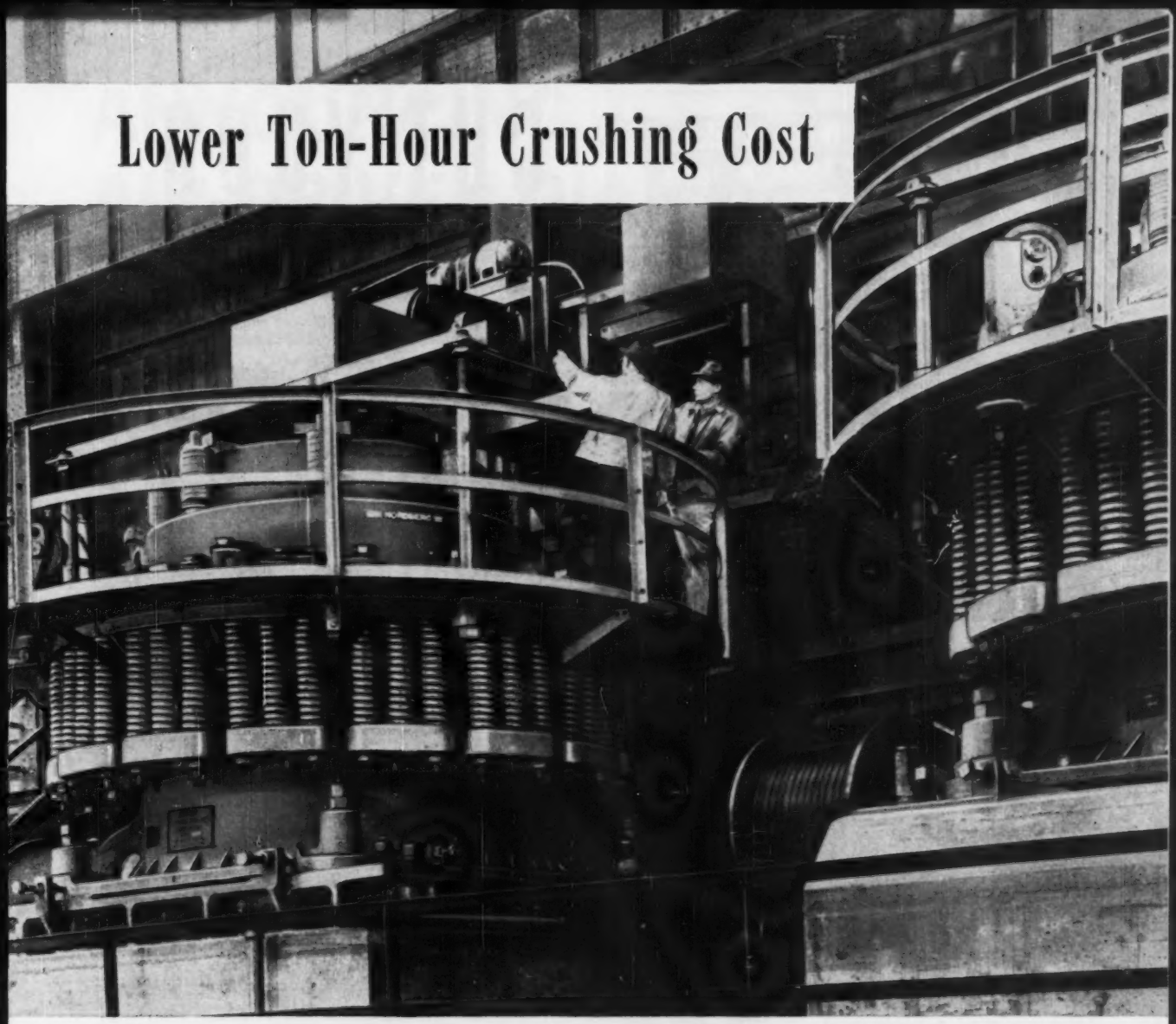
The sand is fed through a gate at the bottom of the bins on to another belt which takes it into a scrubber. Waste material is taken away by belt and dumped.

The scrubbed sand is further refined through screens on to another belt which transports it into a Humphrey spiral plant where heavy mineral concentrates are drawn off. The concentrates, when cleaned and dried, are fed by means of 21 bucket-elevator belts through electrostatic and electromagnetic units which separate the three products.

They emerge at temperatures around 200 deg F and are carried to their respective stockpiles by asbestos-faced conveyor belting.

Uranium oxide production figures for the Union during the first six months of the year rose to more than 6.1-million lb. This is almost 12% above the corres-

Lower Ton-Hour Crushing Cost



with SYMONS® CONE CRUSHERS

Here are some of the reasons why:

You can get up to 900 or more tons per hour per unit . . . Symons Cone Crushers consistently deliver large tonnages of crushed product. Positive setting and a carefully designed crushing cavity assures uniformity of product.

Operate with minimum supervision . . . Symons Cone Crushers require a minimum of man hours for installation, operation and maintenance. Adjustments for product size or liner wear are quickly made, and easy access to all parts makes servicing relatively easy and holds down-time to a minimum.

Ability to withstand rugged service . . . Symons Cones are of heavy duty, quality construction to meet the extremely tough service encountered in reduction crushing of all types of ores and minerals. All bearings are thoroughly lubricated by a pressure circulating system.

Full size range for primary, secondary or tertiary crushing . . . Symons Cone Crushers are built in eleven different sizes, ranging from 22″ to 7′ in diameter, for capacities of from 6 to 900 or more tons per hour. Available with fine, medium, coarse and extra-coarse cavities, to take feed up to 18″ or 20″. *For complete details, send for Bulletin 247.*

SYMONS . . . a registered Nordberg trademark known throughout the world.

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Milwaukee 1, Wisconsin

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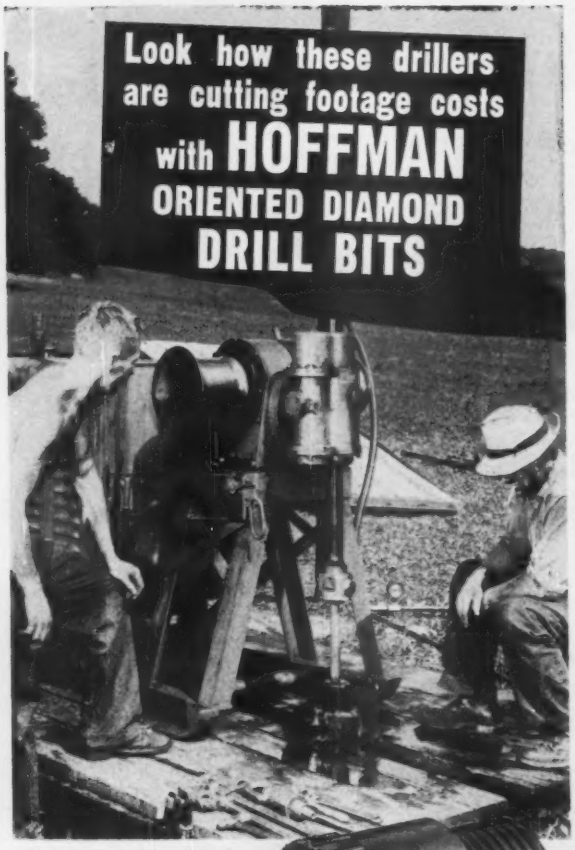

Photo courtesy Acker Drill Co.
Proving out deep coal veins.

other drillers are cutting costs too . . . with Hoffman Bits

Hoffman Bits are engineered to insure the greatest speed and efficiency for the specific formation being drilled. They not only cut faster with low power consumption . . . they permit more accurate job estimates from smooth, easy-to-recover cores.

There's a specially made Hoffman Bit for practically any drilling job . . . prospecting, testing, air and mud coring, reaming, etc. Ask Hoffman about the right bit for your job . . . at no obligation.

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CUT YOUR COSTS WITH DeZurik FABRICATED BONNETLESS KNIFE GATE VALVES

LESS "FIRST COST"

DeZurik Gate Valves cost less to buy because they utilize corrosion-resisting alloy only where the flow can touch it. Non-wetted parts are fabricated from less expensive metals. You buy only the corrosion-resistance you need!

LESS INSTALLATION COST

DeZurik Valves in the wafer pattern (illustrated) are lighter in weight than ordinary gate valves; they need only a minimum of time and effort for installation — require no extra piping support, no elaborate valve bracing.

LESS MAINTENANCE COST

The bonnetless design of DeZurik Gate Valves guarantees non-clogging operation. Their sturdy construction withstands distortion from piping strain and line pressure and assures proper operation of the gate at all times.

Get more information on DeZurik Fabricated Gate Valves from the DeZurik representative in your area, or write for Bulletin 300.

DeZURIK CORPORATION
SARTELL, MINNESOTA

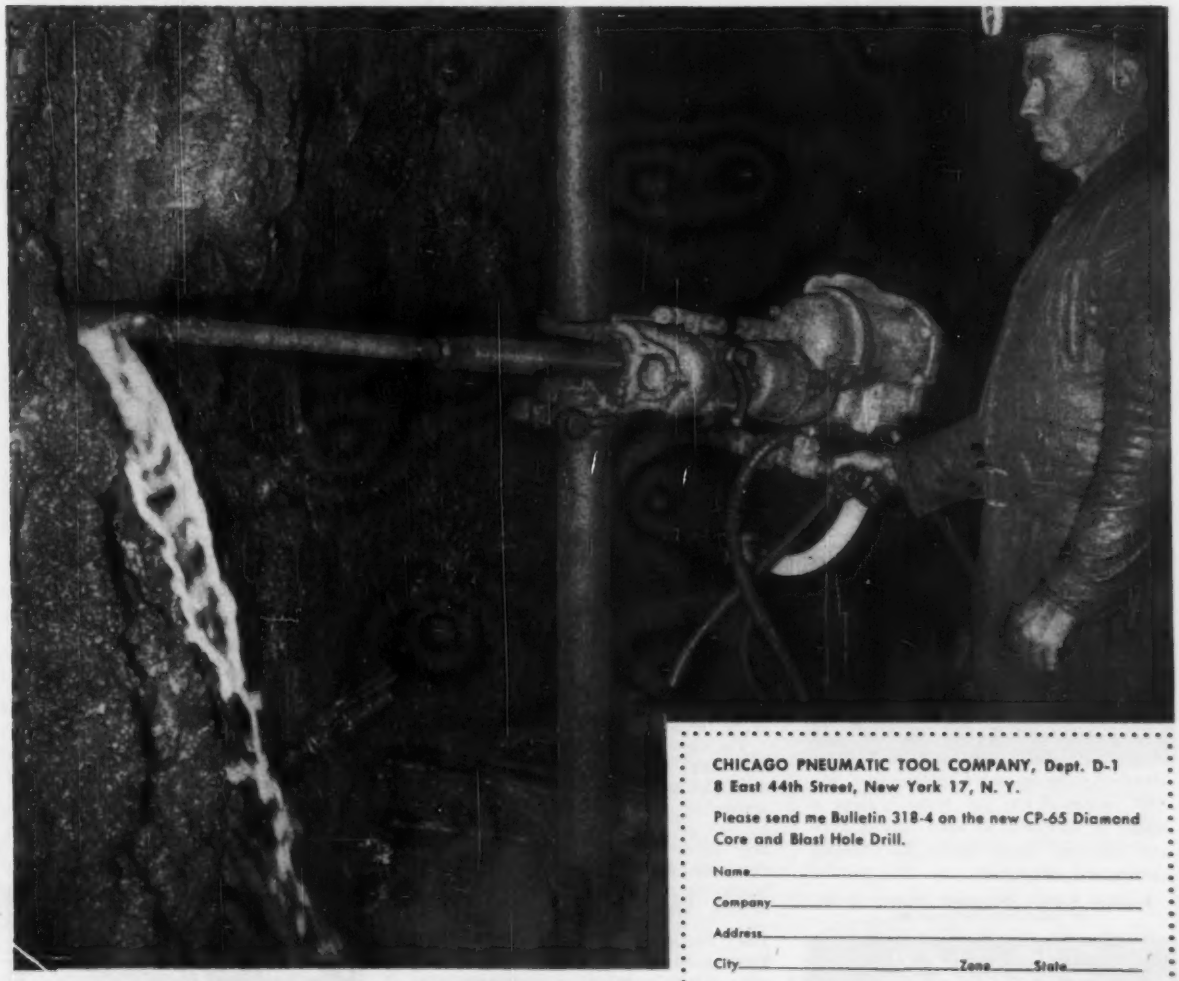
ANNOUNCING *the fastest* AIR-DRIVEN DIAMOND DRILL *ever built!*

The new CP-65 packs the power for faster footage, yet has the handling ease of a drifter.

Ideal for Blast Holes! REVERSIBLE air motor permits rapid unscrewing and screwing of rod joints and quick return of the chuck into drilling position. 50% more motor power means fast drilling rates and greater capacity under all conditions.

Ideal for Coring! 600-foot coring capacity with EW rods and EX fittings. Air motor gives delicacy of bit control for low bit cost and high core recovery. Self-aligning rod puller recommended for holes of 100 feet or more.

The CP-65 is the result of a well engineered and balanced design. Complete drill with built-in swivel head is a compact 42½" unit, weighs just 200 pounds. Clip coupon and get detailed construction, performance and safety features data.



CP-65 Air-driven Diamond Drill set up for blast hole drilling.

CHICAGO PNEUMATIC TOOL COMPANY, Dept. D-1
8 East 44th Street, New York 17, N. Y.

Please send me Bulletin 318-4 on the new CP-65 Diamond Core and Blast Hole Drill.

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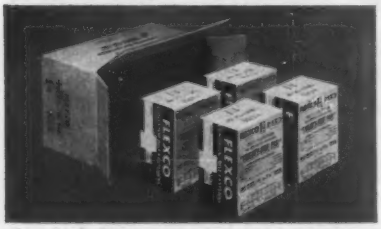
NEW FOR YOUR CONVENIENCE...

FLEXCO

"25-PAK"

TWENTY-FIVE COMPLETE SETS OF FLEXCO HD BELT FASTENERS NOW AVAILABLE IN ONE EASY-TO-HANDLE ECONOMY BULK PACKAGE

There's no need now to carry several 10-set boxes to the job—every "25-PAK" contains 25 complete sets of FLEXCO Fasteners (bottom plates, top plates, clips, nuts and bolts) . . . enough FLEXCO Fasteners to join common belt widths (for example: one "25-PAK" box, size 1½E, will join a 36" belt.) Our savings from bulk-packaging are passed on to you!
Label on each "25-PAK" box has chart indicating the number of FLEXCO HD Fasteners to use for given belt widths.



Standard shipping carton contains four "25-PAK" boxes of one size fastener. Keep a supply of "25-PAKS" on hand. Easy to store and inventory, sturdy boxes and shipping cartons have many uses.

Ask your FLEXCO distributor or write to us for additional information.

Flexible STEEL LACING COMPANY

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FOR THE SPLICE OF A LIFETIME

Africa (*Continued*)

ponding output in 1957. The increase was due in some measure to a small improvement in the yield of oxide per ton treated.

Figures issued by the Southern Rhodesia Government show that the value of mineral production in June amounted to $6.4-million. This is about $280,000 more than in the comparable month of last year.

V. E. McKelve, an American geologist attached to the U.S. Operations Mission in Jordan, has arrived in Amman to carry out a survey of mineral resources and study the possibility of their commercial development.

The survey is expected to last two to three months and will be part of the joint mineral exploration program of the Jordanian Ministry of National Economy and the U.S. Operations' Mission.

As revealed by figures issued by the Department of Customs and Excise, increased production by the Union's gold and uranium industry has helped prevent a serious decline in South Africa's export earnings this year.

While exports of all commodities declined by nearly 6% during the first eight months of this year compared with the same period last year, overseas sales of gold and uranium showed an increase.

Of the 15 shafts involved in the sinking program on Anglo American mines in the Orange Free State, seven have been completed and three new ones are now being sunk. Two working shafts are being deepened and sinking is due to begin at three new shafts in the next few months. Started about two years ago, the program will extend over the next three years. The shafts completed include the No. 3 twin system at Western Holdings and a similar joint twin system at Welkom Mine. At Western Holdings the main hoisting shaft has been sunk to 3,864 ft and its ventilation component to 3,718 ft. At Welkom the comparable depths are 4,490 ft and 4,358 ft.

During the quarter ended September 30 Winkelhaak Mines in the Orange Free State agreed to enter into a prospecting contract with Capital Mining Areas covering a 748 acre region on the farm Winkelhaak 135. A portion of this ground may contain reef which could conveniently be worked by the Winkelhaak Mine.

The contract has a two year duration and states that the company shall have the right to purchase the mineral rights (excluding diamonds and coal) of this ground or any portion of it. In addition to the price paid per acre, the company shall refund the cost of any boreholes previously drilled by Capital Mining Areas.

The President Brand and President Steyn gold mining firms in the O.F.S. will undertake extensive expansion programs involving the sinking of twin shafts on each property aimed at increasing their respective milling rates to 140,000 tons a month within the next three to four years.

This plan supersedes the previous pro-

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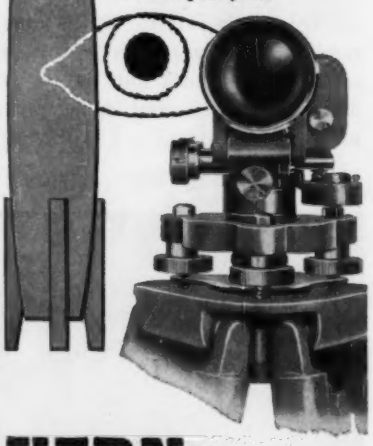

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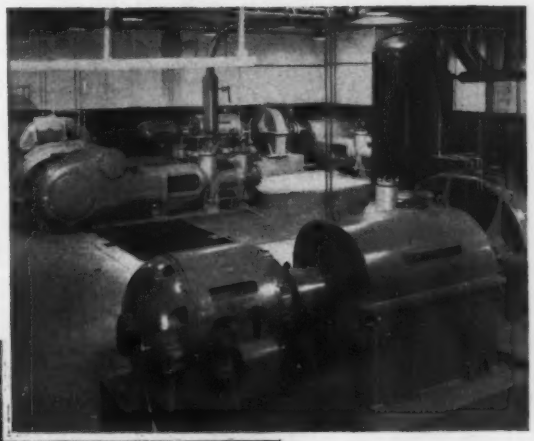
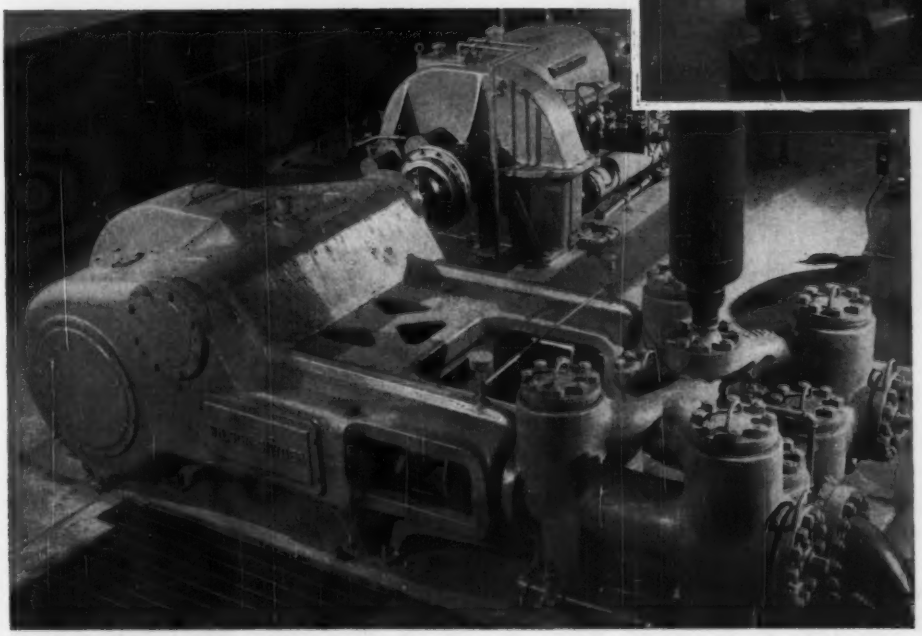
First Coal Slurry Pipeline installs Wilson-Snyder Pumps





Interior views of the pumping station nearest Cleveland showing pumps and drivers.

Consolidation Coal Company's coal slurry pipeline extends over 100 miles from Georgetown, Ohio to a point near Cleveland, Ohio. Three pumping stations are employed to transport the coal slurry through the 10″ line at the rate of 1,300,000 tons of coal annually.

Three Wilson-Snyder heavy-duty duplex double-acting power pumps (two operating and one on standby duty) are installed at each station. Each of these pumps is capable of delivering from 525 to 600 GPM of slurry at 800 psi normal and 1200 psi maximum discharge pressure. Each pump is driven by a 400 HP electric motor through fluid drive and single reduction speed reducer unit.

These pumps are specifically designed for coal slurry service based on extensive research and testing. Fluid chamber is a one-piece casting designed with streamlined passages to minimize flow resistance and assure highest volumetric efficiency. Power end is one-piece totally enclosed roller-bearing equipped, employing oil-bath and positive flow lubrication. Other sizes and types of Wilson-Snyder Pumps are available for pumping various slurries, as well as a complete line of pumping equipment for a wide range of service applications.

Write for catalog containing complete specifications on Wilson-Snyder Pumps and let us quote on your requirements. Wilson-Snyder Works, Oil Well Supply Division of United States Steel, Braddock, Pa.

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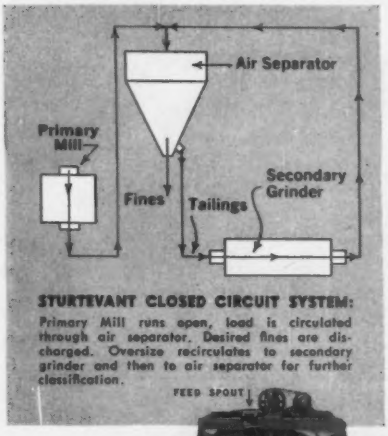
Boost Production of 40 to 400 Mesh Fines As Much As 300%


Air Separator
Primary Mill
Secondary Grinder
Fines
Tailings
STURTEVANT CLOSED CIRCUIT SYSTEM:
Primary Mill runs open, load is circulated through air separator. Desired fines are discharged. Oversize recirculates to secondary grinder and then to air separator for further classification.

Current users of Sturtevant Air Separators include manufacturers of sulfur, soybeans, phosphate, chocolate, feldspar, sand, pigments, limestone fillers, abrasives, plasters, ceramics and cement.

Sturtevant Air Separators Can Lower Power Costs Up To 50%

Production capacity impossible in single-pass grinding results from using Sturtevant Air Separators in closed-circuit grinding systems. They are of proved advantage in all secondary reduction processes.

Fines pass through grinding mills unhindered, are classified, and the oversize returns for further grinding. Grinding mills are free to perform at top efficiency, their output frequently increased as much as 300% and power costs cut up to 50% (documented by 30 years of Sturtevant air separation experience in the cement industry).

Precise Classification; Circulates Loads of 800 tph

Sturtevant Air Separators circulate production loads of up to 800 tph. Simple adjustments make possible counter-action between air currents and centrifugal force to the point where a product of almost any desired fineness may be collected while coarser sizes are rejected.

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Nine models available, diameters from 3 to 18 ft. For more information, request Bulletin No. 087. (Bulletins also available on Micronizers, Blenders, Crushers, Grinders.) Write STURTEVANT MILL CO., 101 Clayton St., Boston, Mass.

Africa *(Continued)*

posal for the sinking of a joint shaft system by the two mines. The two mines have agreed to realign their common boundary along the fault system which forms a natural geological boundary between their respective properties. This realignment is expected to involve an exchange of approximately 200 claims between the two mines.

The rise in the South African gold output so far this year was partly due to an increase from 4,899 dwt. to 5,162 dwt. in the yield per ton of ore milled. The total tonnage during the first half of 1958 amounted to only 32,241,800 tons as against 32,216,000 tons for the first half of 1957. On the other hand, average working costs continued to climb, rising on the average from $6.20 per ton of ore milled in the first six months of 1957 to $6.50 for this year.

Of the total amount of gold produced in the first half of 1958, the new Orange Free State and Klerksdorp (Transvaal) fields produced as much as 23.9% and 14.2%, respectively—about two-fifths of the Union's total gold output.

The European Iron and Coal Community has set up a $5-million fund for ore prospecting in French West Africa. $1.26-million have been allotted for the first year pending an agreement which is expected to be signed between the Community and the Bureau Minier pour La France d'Outre Mer (BUMIFOM).

Out of the first allotment, $664,000 will be spent on aerial and geophysical surveys. The remaining $596,000 will pay for geophysical research of the very promising deposits in central Tschibanga.

For the first time, South African gold mines produced more than 1.5-million fine oz of the metal in a single month (1,502,496 fine oz in September).

Rand mines contributed 626,884 oz, the Far Western Reef accounted for 456,477 oz, and the Orange Free State producers recorded a total of 381,545 oz.

The monthly analysis of production provided by the Transvaal and O.F.S. Chamber of Mines revealed a definite trend. The producers on the Far West Rand and in the Orange Free State reached successive new peaks, and the older Witwatersrand mines, though still the major producers, declined a bit.

The Orange Free State mines, for example, recorded a substantial rise—from less than 24% of the total during the first six months of the year to about 25.5% in September. The Far Western mines produced some 34% of the total output in September which is also an increase over their previous contribution.

The Liberia Mining Co., Ltd., the only firm currently mining and exporting iron ore from Liberia, reports production for the first half of 1958 at 1,029,634 long tons. The iron content of the ore ranged from 62 to 68%. This represents a higher monthly rate of output than in 1957, when the total production was 1,935,083 tons.

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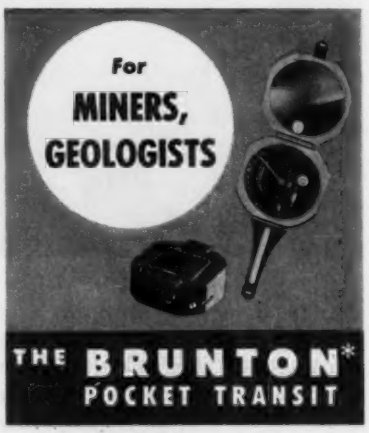

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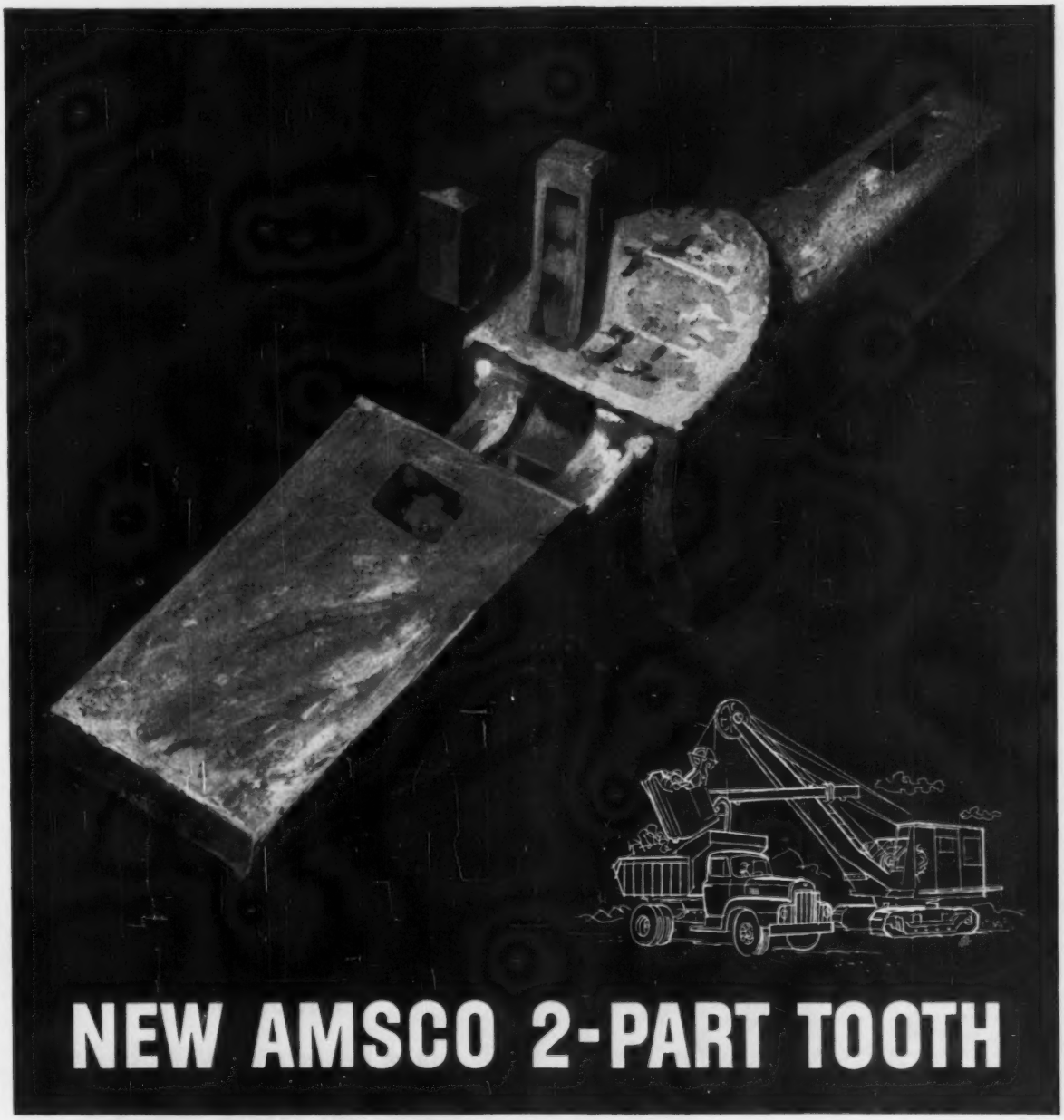

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J-11-58

Africa *(Continued)*

it is estimated that the rate of production will reach about 2.8-million tons per year. Company officials estimate that iron-ore production for the latter half of 1958 will reach 1,110,000 tons, which would indicate a total oputput of 2,139,634 tons in 1958, an increase of about 10 percent over 1957.

IN EUROPE

THE NETHERLANDS

D. Drukker & Zn, N.V., an Amsterdam diamond firm, has produced a new diamond tool for turning, sharpening and profiling grinding stones. It consists of a steel or carbide holder into which four oblong rough diamonds have been fitted. One of the diamonds, which acts as working point, is visible at the top of the holder. The other three are enclosed end to end in the center line of the holder. Through the application of powder metallurgy the diamonds are so firm in their setting that they cannot be broken out and thus can be used until they are finished. When the first diamond has been used up, the metal setting must be ground away until the next diamond is revealed. To ease this operation, the start of each enclosed diamond is indicated by a small circumferential groove on the holder.

These holders are long-lived and save a great deal of time. They can be supplied in various sizes and are also suitable for clamping in a larger holder.

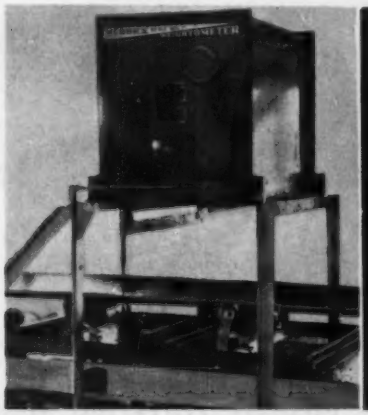
POLAND

The copper works at Legnica, Lower Silesia, is nearing completion. The electro-thermal plant, brick plant, electric furnaces, filters, converters and shaft furnace are all in the final building stage and the entire unit will be in operation by January 1959.

FRANCE

A new iron-ore mine at Saizerais near Nancy has been officially opened. This mine, which has been in semi-industrial activity for a year, is expected to have an annual production capacity of 900,000 metric tons of iron ore by the end of 1958. Further extensions of the mine may increase this capacity to 2-million tons in coming years, when it is expected to supply 4% of the entire output of iron ore in France. The ore reserve is estimated at 100-million tons.

The total output of the mine will be



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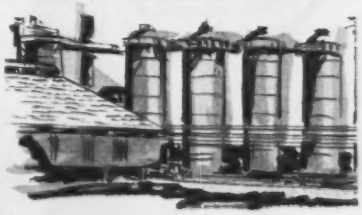

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France (*Continued*)

delivered to the two firms jointly responsible for its development, the Societe des Acieries des Pompey and Societe des Fonderies de Pont-a-Mousson.

As the ore deposit is not deep (140 meters) it has been possible to install escalators for moving both ore and workers. Crushing equipment also has been installed in the mine, and other facilities for beneficiating and stockpiling the ore have been installed on the surface near a navigable river and railway line. The metal content of the ore, after beneficiation, ranges from 32 to 34% iron.

HUNGARY

The government of the U.S.S.R. decided in mid-September to grant a 200-million ruble ($50-million) loan to the Hungarian state under the condition that the credit is used for the development of the Hungarian aluminum industry.

Hungary claims to be Europe's second biggest (after France) bauxite producer. Its 1957 bauxite mining reached 1,150,000 metric tons.

USSR

According to Tass, the Soviet news agency, vast deposits of nepheline have been uncovered in the Tannutuwa area of Eastern Siberia. This area is located to the west of the Lake Baikal near the Outer Mongolian border.

Soviet geologists have already confirmed that the newly discovered deposits are vast and will run into several hundreds of million tons. Major importance is being attached in Soviet circles to this find of essential raw material due to its close proximity to the two new hydroelectric power stations being erected on the Angara and Jennisej rivers.

A Soviet vertical shaft sinking machine, weighing 150 tons and with more than 24,000 parts, was recently described in *Moscow News.*

The journal went on to say that the machine has two disks fitted with cutters which can sink a shaft with a diameter up to 7 meters to a depth of 800 meters.

"This cutter," Moscow News said, "sinks a shaft at the rate of 180 to 200 meters per month—six times faster than by other methods now in use. It is doing the work of at least 70 miners. In addition, operation costs are cut by 25 to 30%.

"An important 'extra' is that as it goes down, the machine faces the shaft with reinforced concrete tubing. It is controlled by one man, and inside it are two or three workers to fasten the tubing into position."

Soviet scientists have claimed a process by which electricity and cement can be produced simultaneously by burning shale in power plants. A weekly paper published by the Soviet embassy in Bonn, Germany made the announcement, but gave no further details.

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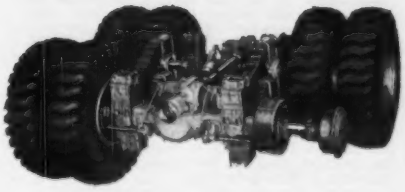

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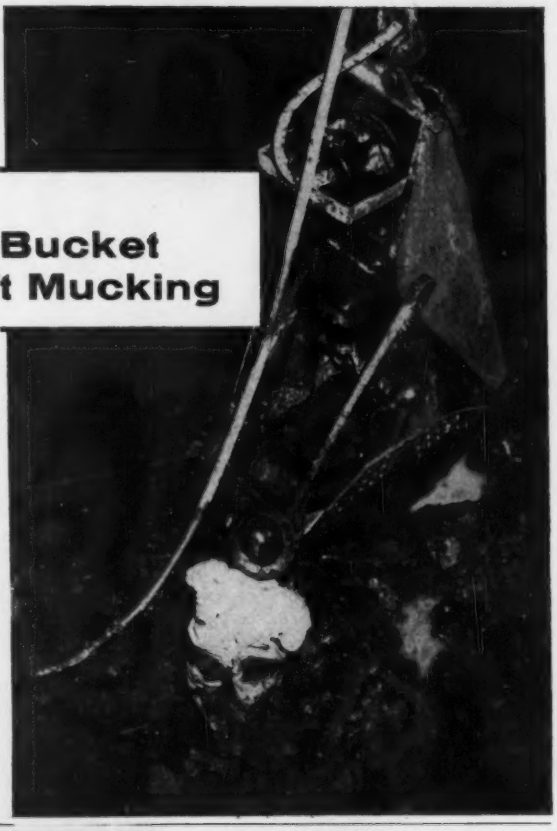

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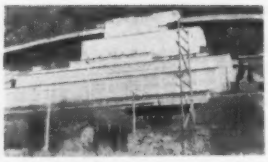

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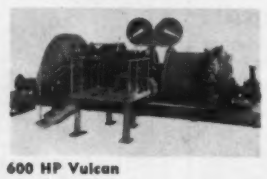

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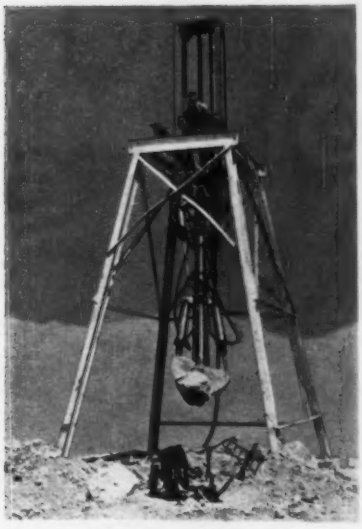

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Acker Drill Co. 184
Aero Service Corp. 194
*Ainsworth & Sons, Inc., Wm. 216
*Allen-Sherman-Hoff Pump Co. ..... Second Cover
Allis Chalmers, Industries Group 166
Allis-Chalmers Manufacturing Co., Industrial Equipment Div. 56–57, 171
Allis-Chalmers Manufacturing Co., General Products Div. 167, 169
Allis-Chalmers Construction Machinery Div. Insert between pp. 68–71, 160–161
American Air Filter Co. 172–173
*American Cyanamid Co. 33
*American Cyanamid Co. Explosives & Mining Chemicals Dept. 41
American Manganese Steel Div., Americaa Brake Shoe Co. 217
*American Smelting & Refining Co. 181
*Anaconda Co. 54–55
*Asea Electric, Inc. 158
Atlas Copco 146

*Babcock & Wilcox Co. 71
*Baker & Adamson Products, General Chemical Div., Allied Chemical Corp. 193
Barber-Greene Co. 155
Bemis Bro. Bag Co. 204
Bethlehem Steel Co. 135, 177
Bixby-Zimmer Engineering Co. 219
Blaw-Knox Co. 222
Broderick & Bascom Rope Co. 12
*Brunner & Lay, Inc. 198
Bucyrus-Erie Co. 10
*Buell Engineering Co., Inc. 150

Carrier Conveyor Corp. 145
Catalytic Construction Co. 149
Caterpillar Tractor Co. 5, 230
Chicago Pneumatic Tool Co. 213
*Christensen Diamond Products 42
Clarkson Co., Div. of Equipment Engineers, Inc. 179
*Colorado Fuel & Iron Corp. 201
*Coppus Engineering Corp. 85

DeZurik Corp. 212
*Denver Equipment Co. 123
Detroit Diesel Engine Div. of General Motors 60–61
*Diamond Drill Contracting Co. 210
Dodge Manufacturing Corp. 195
Dow Chemical Co., Chemical Sales Dept. 28–29
Dow Corning Corp. 190

*Eimco Corp. 16
Electric Steel Foundry Co. 141
Ellicott Machine Co. 216
*Ensign-Bickford Co. 53
Euclid Div., General Motors 199
*Exide Industrial Div., Electric Storage Battery Co. 180
Exolon Co. 220

*Falk Corp. 139
Firestone Tire & Rubber Co. 40
Flexible Steel Lacing Co. 214
Ford Motor Co., Truck Div. 8–9

Galigher Co. 182
*Gardner-Denver Co. 68
Goodrich Industrial Products Co., B. F. 3
Goodrich Tire Co., B. F., A Div. of the B. F. Goodrich Co. 127
*Goodrich Aviation Products, B. F., A Div. of the B. F. Goodrich Co. 30
Goodyear Tire & Rubber Co. 11

*Harbison-Walker Refractories Co. 80
*Hardinge Co. 154
*Harnischfeger Corp. 38–39
Hendrick Manufacturing Co. 218
*Hercules Powder Co., Explosives Div. 66
*Hercules Powder Co., Industrial Chemicals Div. 202
*Hoffman Bros. Drilling Co. 212

Infilco, Inc. 200
*Ingersoll-Rand 1
Industrial Brownhoist Corp. 137
Industrial Nucleonics Corp. 129
International Harvester Co. 74–75, 76–77
International Nickel Co. 207
*Isbell Construction Co. 220

Jeffrey Manufacturing Co. 78–79
*Joy Manufacturing Co. 209

Kaiser Engineers 121
Kellogg Co., M. W. 58
Kennedy-Van Saun Mfg. & Engrg. Corp. 192
*Kern Instruments, Inc. 214
Koehring Co. 26–27

*LeTourneau-Westinghouse Co. 81, 83
Linatex Corp. of America 157
*Link-Belt Co. 72–73
Longyear Co., E. J. 205
Lukens Steel Co. 196

*Mack Trucks, Inc. 221
Mancha Storage Battery Loco. Div., Goodman Manufacturing Co. 35
Manitowoc Engineering Corp. 34
*Mayo Tunnel & Mine Equipment Co. 157
McLanahan & Stone Corp. 142
*Merrick Scale Manufacturing Co. 219
*Mine & Smelter Supply Co. 164–165
*Mine Safety Appliances Co. 229
*Mobile Drilling, Inc. 170

National Filter Media Corp. 178
*National Malleable & Steel Castings Co. 125
National Mine Service Co. 151
*Naylor Pipe Co. 191
New York Engineering Co. 210
*Nichols Engineering Co. 153
*Nordberg Manufacturing Co. 211
Northwest Engineering Co. 13
Nueces County Navigation Commission 184

Ohio Brass Co. 25
Okonite Co. 62

PLM Products, Inc. 140
Phelps Dodge Refining Corp. 208
Philadelphia Gear Corp. 36
Philadelphia Quartz Co. 220
Pipe Linings, Inc. 218
Porter Co., Inc., H. K. Leschen Wire Rope Div. 162
Quaker Rubber Div. 163

Raybestos-Manhattan, Inc., Manhattan Rubber Div. 64–65
Robeling's Sons Corp., John A. 143

Sanford-Day Iron Works, Inc. 14–15
*Sauerman Bros., Inc. 148
Searchlight Section 222–227
Shaft & Development Machines Co. 225
Sheffield Div. Armco Steel Corp. 32
*Simplex Wire & Cable Co. 37
Sly Manufacturing Co., W. W. 144
*Smidth & Co., F. L. 67
Smit & Sons, Inc., J. K. 159
Smith Engineering Works 63
Solar Aircraft Co. 84
Spang & Co. 152
*Sprague & Henwood, Inc. 190
*Standard Oil Co. of California 133
Standard Steel Corp. 203
*Stearns Magnetic Products, A Div. of The Indiana Steel Products Co. 176
Sturtevant Mill Co. 215

*Texas Co. 6–7
Texas Gulf Sulphur Co. 82
Thayer Scale Corp. 168
Thew Shovel Co. 189
Timken Roller Bearing Co. ..... Fourth Cover
*Traylor Engrg. & Mfg. Co. 185
Tyler Co., W. S. 206

United States Rubber Co., Mechanical Goods Div. 119
United States Rubber Co., Tire Div. 187
*United States Steel Corp. 131, 183, 215

Walworth Co. 188
Waukesha Sales & Service, Inc. 157
Wedge-Wire Corp. 156
West End Chemical Co. 175
*Western Machinery Co. 197
Wheel Trueing Tool Co. ..... Third Cover
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp. 59
Wild Heerbrugg Instruments, Inc. 147
*Wilfley & Sons, A. R. 86

Yuba Mining Div., Yuba Consolidated Industries, Inc. 31

PROFESSIONAL SERVICES 223

•

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

•

EMPLOYMENT OPPORTUNITIES 222
EQUIPMENT
(Used or Surplus New)
For Sale 224–227

ADVERTISING SALES STAFF

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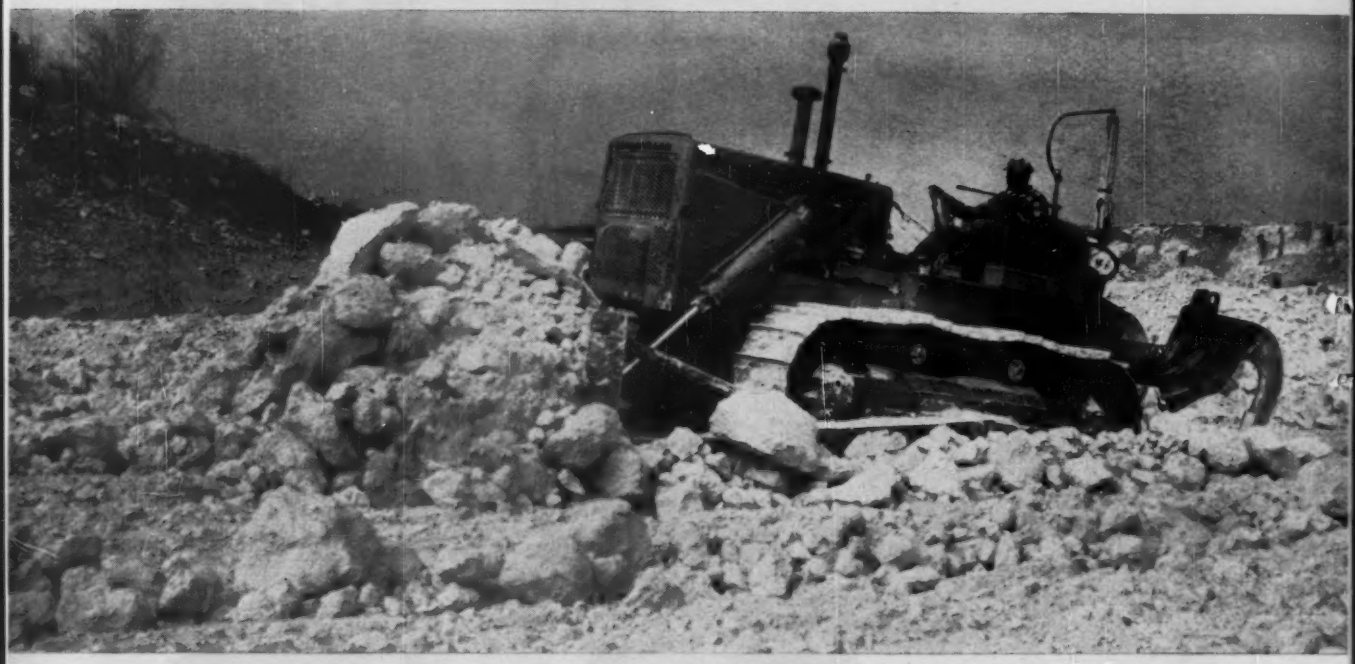
Ripper production up 50%—costs down 25%



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Two-Faced Diamonds help us cut your drilling costs

This diamond business sure is different! Here you see a shot of the operation known as "mechanical setting". Of course, the setter is setting the diamonds *by hand;* they *must* be set by hand because no machine yet devised has the ability to set diamonds with the "best face to the work" that gives you the better cutting power, longer cutting life and greater footage that you want.

Time was when the setter took the actual bit blank, scribed the pattern, drilled an individual hole for each diamond, set the diamond in, tapped it home, peened in the edges of the hole and, although the technique sounds primitive, turned out a pretty good bit. That was "hand setting".

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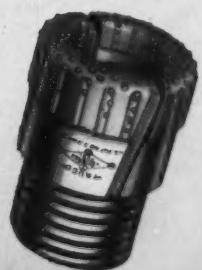
This is called "mechanical setting" because it has the advantage of the precise carbon mold. But, for all this modern mechanization, it still has the all-important advantage of an expert eye and a practiced hand placing each diamond as it *must* be placed for top performance.

The Truco Bits resulting from this combination of mechanization, skill and experience demonstrate their superiority in faster cutting, greater footage, higher salvage, lower diamond cost. Try a Truco and see for yourself.



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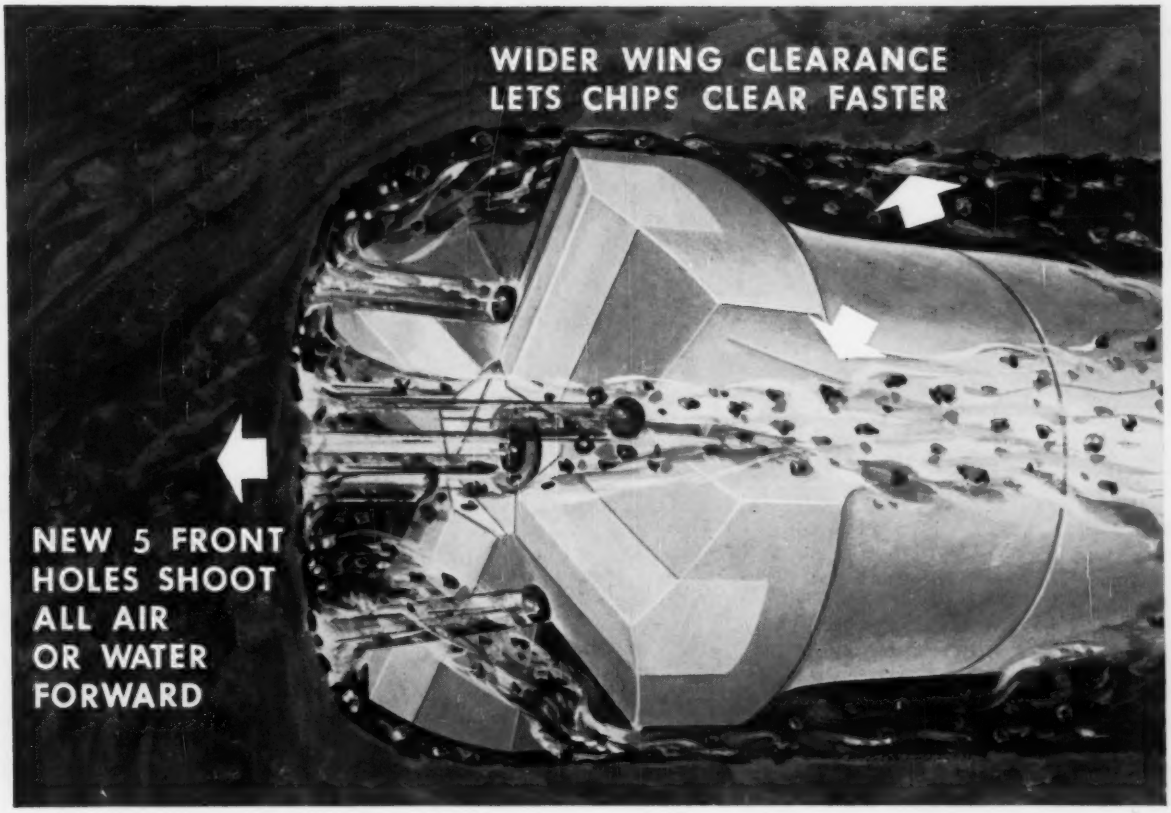

The diagram above shows how the new Timken® threaded carbide bit spends less time "drilling" chips and more time drilling rock—gives you more hole-per-bit. That's because 1) the new Timken threaded carbide bit's newly positioned 5 front holes direct all air or water with jet-action against the rock face and 2) the deeper, wider wing clearance lets chips clear faster. And the deeper relief under the heel allows even more clearance for washed-back chips. This speedier chip removal ends the problem of clogged drill steels and protects bit skirts against damage.

You save even more because new special analysis carbides in the new Timken threaded bit give it greater wear-resistance with added shock-resistance. They can be reconditioned many times. The redesigned heavier wing helps drilling go faster. And the improved thread contact cuts breakage to the lowest point.

For more hole-per-bit on drifters, sinkers and stopers, use the new Timken threaded carbide bit. Write for free brochure that gives all details. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable: "TIMROSCO".

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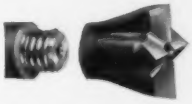

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